PROOF TESTS and PROOF MARKS

THE SYSTEMS USED IN ACCEPTING SMALL ARMS

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Proof Tests and Proof Marks

I: Small Arms Practice of the British Companies

By Calvin Goddard*

CONCERNING proof tests and proof markings as applied to small arms, the average ordnance officer or arms enthusiast knows all too little. And while this series of articles makes no pretense of treating the matter exhaustively, the author nevertheless feels that it will supply much data not readily available elsewhere. He therefore offers it to readers of ARMY ORDNANCE in the hope that it may, for some of them, clarify certain questions upon which they have heretofore been unable to secure authoritative information.

Confining our studies for the moment to English-speaking countries, we find that the proving of arms in Great Britain dates from 1637, on March 14 of which year, the "Master Wardens and Society of the Mystery of Gunmakers of the City of London" (later known as the "Gunmakers' Company") was granted a royal charter. The reasons for the organization of such a group may be deduced from a perusal of this document, which says, in substance—"That divers blacksmiths and others unexpert in the art of gunmaking had taken upon them to make, try, and prove guns after their unskillful way, whereby the trade was not only much damnified, but much harm and danger through such unskillfulness had happened to His Majesty's subjects."

It is evident that the charter was designed to remedy such abuses. The powers it conferred were wide, in that it permitted the Gunmakers' Company to "search for and prove all manner of hand guns, great and small, daggs and pistols, and every part thereof, whether made in London or the suburbs, or within ten miles thereof, or imported from foreign parts, or otherwise brought thither for sale." Various standards to be followed in proving of sundry types were thereupon established, and in a second charter granted the Company in 1672, it was empowered to enforce the proving of all arms then in use in England.

Now the "proving" of a weapon involves the firing from it of certain established charges of powder and ball (or shot), both of these in excess of those normally employed, in order to determine whether it is soundly made and capable of withstanding the punishment attendant upon firing with such overloads. It is commonly conducted in two stages, the first involving the barrel alone, and known as "provisional" proof, while the next follows after barrel and action have been assembled and the arm is ready for use, save for minor finishing operations. This last is known as "definitive" proof.

In each instance the barrel, provided it passes the test without developing evidence of weakness, is stamped with a mark indicating its acceptance. After the second trial, the action receives a similar mark. The stampings vary according as the arm is a shot gun, rifle, pistol, revolver, etc., different types of weapons having been grouped into ten classifications according to the British proof regulations adopted in 1925.

Obviously, the number of classes listed has increased along with advances in cartridge manufacture and small arms engineering. Thus, when Greener published his 1881 edition of "The Gun and Its Development," there were but five, plus one subclassification (added in 1875), this last applying to choke-bored shotguns. Choke boring was then of recent introduction, and was responsible for the departure from the longstanding custom of proving barrels with solid leaden slugs. In the case of weapons of this new class, a charge of shot was used for the proof test, a bore-diameter ball being too large to pass through the choked portion of the tube. At present, shot charges have entirely supplanted the solid bullet for the proof of smooth-bored British weapons.

In the early 90's, smokeless powder began to come into wide use. As a result, an optional "Nitro Proof" was introduced in 1896. After the lapse of another ten years, this had become practically a routine measure, and thenceforward all arms subjected to the "nitro" proof received additional stampings indicating this.

SINCE 1925, guns nitro-proved receive stampings which are in effect combinations of the former definitive and nitro-proof marks, and in addition the bore diameter, and length of cartridge case for which adapted, appears on each barrel. Thus the period of manufacture of a British-made shotgun (i. e. before or after 1925) may be determined by the presence or absence of die marks indicating the length of the cartridge case.

As may be seen by consulting Table A (page 141) [this is known as "Scale No. 4 for the proof of Arms of the Fourth Class (Breech Loading Arms of Smooth Bore) in the 1925 Proof Regulations"] the amount of powder employed in the present-day provisional proof is approximately three times the service charge, while the weight of the shot about equals that used in the field. In the definitive proof, the charge of powder is approximately twice that (by weight) of a service black powder charge, while the shot charge exceeds the standard load by about 50 per cent.

In column two of Table A we find certain gauge designations recorded in the form of improper fractions. These are included among the markings now imprinted upon shotgun barrels of British make, according to the actual bore diameter of the arm under test, as indicated in column three of the table.

For the purposes of the proof tests, in gauges between 4 and 10, each size is divided into three parts, according to the actual bore diameter of the arm, while in gauges from 11 to 17, but two divisions per gauge exist. In the first group, the subclassifications under a given gauge are indicated in triple groupings, such as: $4; \frac{4;}{1}\ \frac{4,}{2}$ while in the second they appear listed doubly, as 12; $\frac{12.}{1.}$ Thus (consult column 3, Table A) guns of 12 gauge falling into subclass 12 are all those having a bore diameter of .729 to .739, while those in class $\frac{12}{1}$ will run from .740 to .750. If .751 or above, a gun automatically falls into the 11 gauge category, and is proved as such. (The gauge size is estimated nine inches forward of the breech.)

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TABLE A—SCALE No. 4

FOR THE PROOF OF ARMS OF THE FOURTH CLASS—BREECH-LOADING ARMS OF SMOOTH BORE—(*See Rules 10, 14, 30, 51 and 52*).

Nominal Size of Cartridge.	Gauge as marked at Proof.	Diameter of Bore.	Provisional Proof. Powder, T.P.		Provisional Proof. Shot.		Nominal Length of Chamber.	Definitive Proof. Powder, T.S.P.		Definitive Proof. Shot.		Service Charge. Black Powder or Equivalent.		Service Charge. Shot.	
			grains.	drs.	grains.	oz.		grains.	drs.	grains.	oz.	grains.	drs.	grains.	oz.
	5/2	1·026													
	5/1	1·001	740	27			4″								
	5	·976													
4					1421	3¼	4¼″	492	18	2050	4 11/16	246	9	1530	3½
	6/2	·957													
	6/1	·938	649	23¾											
	6	·919													
	7/2	·903													
	7/1	·888	567	20¾			3¼″								
	7	·873					3½″	328	12	1367	3⅛	164	6	930	2⅛
	8/2	·860													
8	8/1	·847	492	18	984	2¼	3¾″	382	14	1613	3 11/16	191	7	1093	2½
	8	·835													
	9/2	·824					4″								
	9/1	·813	417	15¼			4¼″	436	16	1832	4 3/16	218	8	1203	2¾
	9	·803													
	10/2	·793					2⅝″	218	8	936	2⅛	95	3½	601	1⅜
	10/1	·784	348	12¾											
10	10	·775			711	1⅝	2¾″ 2⅞″	232	8½	984	2¼	109	4	656	1½
	11/1	·763	294	10¾			3″ 3¼″	260	9½	1094	2½	123	4½	765	1¾
	11	·751													
	12/1	·740	266	9¾			2½″ 2⅝″	178	6½	738	1 11/16	82	3	492	1⅛
12	12	·729													
	13/1	·719	260	9½	547	1¼	2¾″ 2⅞″	206	7½	875	2	92	3⅜	547	1¼
	13	·710					3″ 3¼″	226	8¼	957	2 3/16	102	3¾	656	1½
	14/1	·701	246	9											
14	14	·693					2½″	164	6	685	1 9/16	80	2⅞	465	1 1/16
	15/1	·685	239	8¾	492	1⅛	2¾″	191	7	793	1 13/16	85	3⅛	520	1 3/16
	15	·677													
	16/1	·669	226	8¼			2½″	154	5⅝	656	1½	75	2¾	437	1
	16	·662													
16	17/1	·655	218	8	437	1									
	17	·649					2¾″ 3″	178	6½	738	1 11/16	82	3	492	1⅛
	18	·637	211	7¾											
	19	·626	205	7½			2½″	136	5	574	1 5/16	65	2⅜	383	⅞
20	20	·615			383	⅞									
	21	·605	198	7¼			2¾″ 3″	157	5¾	657	1½	75	2¾	437	1
	22	·596													
	23	·587	191	7											
24	24	·579	184	6¾	355	13/16	2½″	123	4½	520	1 3/16	58	2⅛	328	¾
	25	·571													
	26	·563	178	6½			2¾″	140	5⅛	575	1 5/16	65	2⅜	383	⅞
	27	·556	171	6¼			2½″	113	4⅛	465	1 1/16	52	1⅞	273	5/8
28	28	·550	164	6	328	¾									
	29	·543	150	5½			2¾″	130	4¾	547	1¼	58	2⅛	328	¾
	30	·537	144	5¼											
	31	·531													
	32	·526	137	5											
	33	·520					2½″	95	3½	410	15/16	41	1½	246	9/16
32	34	·515			246	9/16									
	35	·510	130	4¾			2¾″	109	4	465	1 1/16	48	1¾	300	11/16
	36	·506													
	37	·501	123	4½											
	38	·497													
	·410	·410					2″	55	2	219	½	23	⅞	137	5/16
.410	to	to	78	2½	219	½	2½″	65	2⅜	273	5/8	27	1	191	7/16
	·415	·415													
.360	·360	·360	41	1½	82	3/16	1¾″	34	1¼	137	5/16	13½	½	82	3/16

NOTE.—The Gauges and Diameters in Bold Type are those to which barrels are usually bored for Definitive Proof for use with the Cartridges belonging to the groups in which they are included.

WHILE London was, in 1637, no doubt the hub of the British arms industry, Birmingham eventually came prominently into this field, so much so that in 1813 an Act of Parliament authorized the establishment there of a laboratory or "proof house" where arms could be tested, thus saving the expense of shipment to London and return. For several decades, however, the character of the tests applied at Birmingham differed from those in use in London, being less severe, with the result that the Birmingham proof fell somewhat into disrepute. In 1868, however, another act requiring the same order of trials at both places was passed and since then they have not differed in any respect. The proof marks employed are unlike, however, the Gunmakers' Company (London) and the "Guardians" (Birmingham), having distinctive sets of dies for this purpose. The rules of proof now current in these two cities, the stampings applied to arms meeting these, and the conditions under which they are affixed, are as follows: (reprinted from "Rules, Regulations and Scales Applicable to the Proof of Small Arms," London: 1925):

Schedule B

CLASSIFICATION OF SMALL ARMS

FIRST CLASS—Single-barrelled muzzle-loading arms of smooth bore.

Second Class—Double-barrelled muzzle-loading arms of smooth bore.

Third Class—Muzzle-loading rifled arms.

Fourth Class—Breech-loading arms of smooth bore.

Fifth Class—Breech-loading rifled arms, including express rifles, declared for use with black powder only.

Sixth Class—Breech-loading rifles, declared for use with nitro powders, not being of the seventh, eighth and tenth classes.

Seventh Class—Breech-loading rifled arms chambered to take a military small-arm cartridge, and not being of the tenth class.

Eighth Class—Breech-loading rifled arms especially constructed for use with shot and bullet, having the whole, or a portion only, of their bore rifled, and not being of the fifth class.

Ninth Class—Revolving arms and repeating and automatic pistols.

Tenth Class—Breech-loading rifled military arms.

Definitions of Kinds of Proof.—1. There shall be two kinds of compulsory proof, viz. (except where one proof is specifically provided for): provisional and definitive. There shall also be a voluntary proof. Provisional proof is the first proof applied to barrels which, according to these rules, require two proofs. Definitive proof is that applied as the second proof to barrels which require two proofs, also that applied to those which require one proof only under Rule 6. Voluntary proof is an additional one applied after the definitive proof, according to Rule 18.

Powders Used in Proof.—2. The descriptions of powder used in proof shall, except as provided in Rule 18, be as follows:

That known as "Tower Proof," or "T. P.," which shall be of strength equal to Waltham Abbey "R. F. G. 2," and of a grain varying between Nos. 4 and 5; that known as Curtis's and Harvey's "T. S. P."; that known as Curtis's and Harvey's "T. S. No. 2": that known as Colonel Hawker's "Duck Gun Powder"; and the nitro powder known as "Cordite," or any other description of nitro powder which may hereafter, from time to time, be adopted by His Majesty's War Departm[illegible]

Provided, nevertheless, that, if any of the powders for [illegible] use of which this rule provides, should be considered by th[illegible] Two Companies unsuitable for the proof of any particular description of barrel, they shall have power to adopt such other powder as they may consider to be most suitable, having first obtained the approval of His Majesty's principal Secretary of State for the War Department.

Shot.—3. The shot used in proof shall be that known as "Soft Shot," size number 6.

Bullets.—4. The bullets used in proof shall be of pure lead, except as provided in rules 12, 13, 15, 16 and 25, and of such forms as are hereinafter defined in the rules relating to the proof of the different classes.

Wads.—5. The wads used in proof shall be of felt or other suitable material, and shall not exceed in thickness one diameter of the bore.

Proofs necessary for different classes.—6. Barrels for arms of the first, sixth, seventh, ninth and tenth classes shall be proved once definitively, and for those of the second, third, fourth, and eighth classes, provisionally and definitively, except as provided in Rule 23—provided, nevertheless, that barrels for arms of the second and third classes, sent in a state for definitive proof, may, at the request in writing of the sender, be proved once only according to the scale for Provisional Proof.

Proof of single muzzle-loading barrels of smooth bore.—7. Barrels for arms of the first class shall be proved with T. P. powder and shot, according to Scale No. 1, and shall be marked as herein provided in Rule 38.

Proof of double muzzle-loading barrels of smooth bore.—8. Barrels for arms of the second class shall be provisionally and definitively proved with T. P. powder and shot, according to Scale No. 2, and marked as herein provided in Rules 37 and 38, or may be proved once only, as provided in Rule 6, and marked as herein provided in Rule 38.

Proof of muzzle-loading rifles.—9. Barrels for arms of the third class shall be provisionally and definitively proved with T. P. powder and a cylindrical flat-ended bullet, according to Scale No. 3 and marked as herein provided in Rules 37 and 38, or may be proved once only, as provided in Rule 6, and marked as herein provided in Rule 38.

Proof of breech-loading shot barrels.—10. Barrels for arms of the fourth class shall be provisionally proved with T. P. powder and shot and definitively proved with T. S. P. powder and shot to cover the use of nitro powders according to Scale No. 4. Automatic and repeating guns may be fired with the number of shots the magazine will contain. Barrels proved under this rule shall be marked as herein provided in Rules 37, 38, 40 and 58.

PROOF of Breech-loading rifles Class 5.—11. Barrels of arms of the fifth class may be provisionally proved with T. P. powder and a cylindrical flat-ended bullet. They shall be definitively proved with T. P. powder and a cylindrical flat-ended, or cylindro-conoidal bullet, according to Scale No. 3 and shall be marked as herein provided in Rules 38 and 54. Provided, nevertheless, that, should a barrel be chambered for a cartridge which cannot contain the service charge defined in the scale, it may receive a special definitive proof with a charge based upon the maximum service charge of such cartridge. Provided also that, should a barrel be intended to be used with a larger charge than the service charge define in the scale, the sender shall declare the same in writing,

special definitive proof based upon such declared service charge which the Two Companies may jointly decide to be suitable shall be applied and shall be marked as herein provided in Rules 38 and 54.

Express rifles of this class may be provisionally proved with T. P. powder and a cylindrical flat-ended bullet. They shall be definitively proved with T. S. 2 powder and a cylindrical flat-ended bullet, or such other form as may be, from time to time, considered to be most suitable according to Scale No. 5 and shall be marked as herein provided in Rules 38 and 54, with the addition of the abbreviation "EX" signifying "EXPRESS."

Proof of breech-loading rifles Class 6, with nitro powder.—12. Barrels for arms of the sixth class may be provisionally proved with T. P. powder and a cylindrical flat-ended bullet, according to Scale No. 3. They shall be definitively proved with cordite powder, or such other nitro powder as the Two Companies may, under the provisions of Rule 2, consider to be most suitable, and with a nickel-covered bullet, similar in form to that of the service cartridge for which the barrels are chambered, or of such other material and form as may be, from time to time, considered to be most suitable. The service charge shall be declared in writing by the sender, and the proof charge shall be such as shall give a stress not less than thirty per cent. and not over over forty-five per cent. over that of the service charge or the standard charge, whichever is the greater, as may be readily ascertainable. Automatic and repeating rifles may be fired with the number of shots the magazine will contain. Barrels proved under this rule shall be specially marked as hereinafter provided in Rules 38, 40 and 55.

Proof of Breech-loading rifles, Class 7.—13. Barrels for arms of the Seventh Class may be provisionally proved with T. P. powder and a cylindrical flat-ended bullet, according to Scale No. 3. They shall be definitively proved with cordite powder, or such other nitro powder as the Two Companies may, under the provisions of Rule 2, consider to be most suitable, and a nickel-covered bullet, of a similar form to that of the service cartridge for which the barrels are chambered, or of such other material and form as may be, from time to time, considered to be most suitable. The proof charge shall be such as shall give a stress not less than thirty per cent., and not more than forty-five per cent., over that of the service charge, as may be readily ascertainable. Automatic and repeating rifles may be fired with the number of shots the magazine will contain. Barrels proved under this rule shall be specially marked as hereinafter provided in Rules 38, 40 and 56.

Proof of barrels constructed for shot and ball.—14. Barrels for arms of the Eighth Class shall be provisionally proved with T. P. powder and shot, according to Scale No. 4 for the Fourth Class. They shall be declared in writing by the sender to be of the Eighth Class when presented for definitive proof, and shall be proved with T. S. P. powder according to Scale No. 4, and marked as provided in Rules Nos. 38, 40 and 58. In case barrels are intended to be used with larger charges of powder than the ordinary service charges set forth in the said Scale No. 4, or in which nitro powders are intended to be used with ball, they shall be so declared in writing by the sender, and a proof charge which the Two Companies may jointly decide to be most suitable thereto shall be applied. Barrels proved under this rule shall be specially marked as hereinafter provided for in Rules Nos. 38, 40, 57, 58 and 59.

PROOF of revolvers and repeating pistols.—15. Arms of the Ninth Class shall be proved with a cartridge of the maximum size suitable thereto, and containing such a charge of powder, and such a bullet, as, in the opinion of the Two Companies, will cover the service charge to be used. Revolving arms shall be proved once definitively in each chamber. Repeating or automatic pistols shall be proved definitively, and may be fired with the number of shots the magazine will contain. Arms of the Ninth Class shall be marked as hereinafter provided in Rule 48.

Proof of rifled military arms Class 10.—16. Barrels for arms of the Tenth Class shall be proved once definitively with cordite powder or such other nitro powder as the Two Companies may, under the provisions of Rule 2, consider to be most suitable, and a nickel-covered bullet of a similar form to that of the service cartridge, for which the barrels are chambered, or of such other material and form as may be from time to time considered to be most suitable. The proof charge shall be such as shall give a stress not less than thirty per cent. and not more than forty-five per cent. over that of the service charge as may be readily ascertainable. Automatic rifles and machine guns shall be proved definitively and may be fired with the number of shots the magazine will contain. Barrels proved under this rule shall be specially marked as hereinafter provided in Rule 49.

Proof of breech-loading shot barrels for use with larger cartridges.—17. In case barrels of the Fourth Class are intended to be used with larger charges of nitro powders than ordinary service charges, then the quantities of powder and shot so intended to be used shall be declared in writing by the sender, and a proof charge which the Two Companies may decide to be suitable shall be applied. Barrels proved under this rule shall be marked as hereinafter provided in Rules 40 and 58.

Special proof of breech-loading barrels.—18. Barrels for arms of all classes after having been definitively proved may at the request in writing of the sender (subject to Rule 29) receive a voluntary proof to cover any declared service load, pressure in tons per square inch, kilos per c/m^2, or atmospheres, with a proof charge which the Two Companies may decide to be suitable. Such arms shall be marked with the declared load and, or, the marks "S.P." as hereinafter provided in Rules 41 and 64.

Proof of Government arms.—19. For barrels of all military arms, sent for proof, manufactured for the British or Colonial Governments, the method of proof shall be the same as that employed by His Majesty's War Department.

Length of chambers.—20. The nominal length of cartridge case to be used in barrels of all breech-loading arms shall be declared in writing by the sender, and when deemed desirable by the proof authorities, the nominal length of the case for which the arm has been proved shall be marked in accordance with Rule 52.

Provisional proof of shot barrels larger than 4.—21. Barrels for arms of the Second Class of a larger gauge than 4, for which no charges are laid down in the scales applicable to such classes, shall be provisionally proved according to Scale No. 1 for the First Class.

Definitive proof of shot barrels larger than 4.—22. Barrels for arms of the Second Class of a larger gauge than 4, sent for definitive proof, for which no charges are laid down in the scales applicable to such classes, shall have the service charge declared in writing by the sender, and the proof charge

shall be twice the weight of powder and one and one-third the weight of shot of such service charge. The service charge shall be marked upon the barrels, as provided in Rule 60.

Proof of Punt Guns.—23. Barrels for arms of the First, Second and Fourth Classes of not less than five feet six inches long shall be proved once definitively with Col. Hawker's Duck Gun Powder, and shot. The service charge shall be declared in writing by the sender, and the proof charge shall be twice the weight of powder and one and one-third the weight of shot of such service charge. The service charge shall be marked upon the barrels, as provided in Rule 60.

Declaration necessary for choke-bored barrels, and definition of the same.—24. Barrels for arms of the First, Second, and Fourth Classes which are choke-bored shall be declared to be so, in writing, by the sender when presented for definitive proof. Choke-bored barrels are such as have the diameter of the bore at the muzzle less than at some point behind the muzzle, other than the chamber, or the cone or lead in front of the chamber. Barrels which are choked .004 of an inch may, at the request in writing of the sender, be marked, and those which are choked .008 of an inch shall be marked, when proved, as hereinafter provided in Rule 53. Barrels which are choked .008 of an inch or more, and not marked as provided in Rule 53, are required to be reproved.

Proof of barrels not provided for in classification and scales. 25. A barrel of any description for which the classification and scales of proof do not provide, or to which the said scales are, in the opinion of the Two Companies, inapplicable or unsuitable, shall be proved with such a charge of powder, and a bullet or charge of shot, which the Two Companies may jointly decide to be most suitable for such barrel, and they may, if they think fit, require the service charge to be declared by the sender. In case a barrel shall not be capable of containing such a proof charge, as large a charge as the barrel will contain shall be applied. Barrels proved under this rule shall be marked as hereinafter provided in Rule 61.

Certain cartridge cases to be supplied by sender.—26. Whenever a barrel is sent for proof chambered for a cartridge of unusual size, or of a pattern not in general use, a complete service cartridge and the cartridge cases and bullets required to prove such barrel shall be provided by the sender.

Proof houses not responsible for the proper proof of barrels unaccompanied by necessary requests or declarations.—27. The Two Companies will not be responsible for the proper proof or marking of, and may refuse to prove, barrels which, according to Rules 12, 13, 14, 17, 18, 20, 21, 22, 23 and 24, require special definitive proof, voluntary proof, or special marking, unless such barrels are accompanied by the necessary requests or declarations, defined in the said rules, when presented for proof. Provided always that the Two Companies may prove and mark barrels unaccompanied by any request or declaration in such a manner, as, in their opinion, such barrels should be proved and marked.

PROOF houses may refuse to prove certain barrels.—28. Should a barrel be presented for any special or voluntary proof, which, though it may belong to a class to which such proof may be applicable, is unsuited to such proof, the proof master of the Company to which it is presented may refuse to prove it. He may also refuse to prove a barrel declared to be of a certain class, which is not of such class, except for the class to which it should belong.

Effacing of proof marks.—29. If a barrel, which has already been proved and marked with the definitive proof and view marks, be again presented for definitive or voluntary proof, and shall fail to stand proof, the person or persons, respectively, who is or are entitled to impress the proof and view marks, shall efface the existing marks of definitive and voluntary proof therefrom. Should a barrel which has obviously been weakened after definitive proof be brought to the notice of the proof master of either of the Two Companies, it may be reproved definitively, without the consent of the owner. Should a barrel be brought to the notice of the proof master of either of the Two Companies which is in such a condition that it would be impossible to reprove it, or to properly view it, the marks of definitive and voluntary proof may be effaced therefrom by the beforementioned person or persons.

BARRELS enlarged in bore require reproof.—30. Any barrel which may have been enlarged in the bore after definitive proof, so that the bore mark impressed upon it at proof is not a true representation of the diameter, shall be required to be reproved definitively, and if it shall have received a voluntary proof, it shall be required to be reproved with a voluntary proof; such, for example, as an enlargement from $\frac{9}{2}$ to 8 or $\frac{13}{1}$ to 12, as set forth in Scale No. 4.

Proof powders open to government inspection.—31. The various powders used in proof shall, at all times, be open to the inspection, without notice, of any officer authorized for the purpose by the Secretary of State for War, who may take samples of the same for examination or trial.

Proof of foreign arms.—32. All complete foreign small arms or barrels complete with actions thereof liable to proof under the said Act shall be proved and marked with special proof marks, as provided in Rules 37, 38 and 40, with the addition of the words "not English make."

Reproof of old arms.—32A. All old proved small arms submitted for reproof shall be reproved and marked, in addition to any other proof mark required hereunder or by the said Act, with a special proof mark as hereinafter provided in Rules 41A and 63.

Conditions Precedent to Proof

Single smooth-bored barrels.—33. Barrels for arms of the First Class sent for proof shall be bored and ground, and in a proper state for setting up, with the squares set off, looped, and the proper breeches in, with the thread of the screws sound and full. Barrels for percussioned arms shall be percussioned and have nipples in. Twisted barrels shall be fine bored and struck up.

Other kinds.—34. Barrels for arms of the Second, Third, Fourth, Fifth, Sixth, Seventh and Eighth Classes:

For provisional proof—Barrels of plain metal shall be fine bored and turned or ground, and those of twisted metal shall be struck up in addition. Should plugs be attached, the touch-holes drilled in the plugs must be of a diameter not exceeding one-sixteenth of an inch.

For definitive proof—All barrels shall be struck up and smoothed, the insides shall be clean, the ribs fairly struck up, and such as are muzzle-loading shall have breeches properly percussioned, huts filed up, the proper breeches and nipples attached, with the thread of the screws sound and full. Barrels for rifled arms shall be rifled.

Actions to be attached.—35. Barrels for breech-loading arms shall be definitively and voluntarily proved with the

action attached. The action shall be finished or in the finished-filed state.

Revolving and repeating pistols to be complete.—36. Revolving arms shall have the cylinder or chambers with the revolving action and firing work complete and in working order. Repeating pistols shall be complete and in working order.

37. The marks denoting provisional proof shall be as follows: Provisional Marks, London

As to the Gunmakers' Company: The letters "G P" interlaced in a cypher surmounted by a lion rampant, thus:

On arms of English make. On arms of foreign make.

Followed by the words "Not English Make"

Provisional Mark, Birmingham

As to the Guardians: The letters "B P" interlaced in a cypher surmounted by a crown, thus:

On arms of English make. On arms of foreign make.

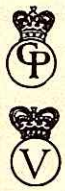
Followed by the words "Not English Make"

38. The marks denoting definitive proof shall be as follows:

Definitive Marks, London

As to the Gunmakers' Company: The proof mark, being the letters "G P" interlaced in a cypher surmounted by a crown, and the view mark, being the letter "V" surmounted by a crown, thus:

On arms of English make. On arms of foreign make.



Followed by the words "Not English Make"

Definitive Marks, Birmingham

As to the Guardians: The proof mark, being the letters "B P" surmounted by a crown, and the view mark, being the letters "B V" surmounted by a crown, thus:

On arms of English make. On arms of foreign make.

Followed by the words "Not English Make"

39. The marks denoting the special proof of barrels proved according to Rule 16, shall be as follows:

Definitive Marks, Rifles, Class 10, London

As to the Gunmakers' Company: The letters "L M P" interlaced in a cypher surmounted by a lion rampant thus:

On arms of English make. On arms of foreign make.

Followed by the words "Not English Make"

The words "Nitro Proved" to be impressed on the barrel only.

Definitive Marks Rifles, Class 10, Birmingham

As to the Guardians: The letters "B M" surmounted by a crown, thus:

On arms of English make. On arms of foreign make.

Followed by the words "Not English Make"

The words "Nitro Proved" to be impressed on the barrel only.

40. The proof mark applied to barrels proved for use with nitro powders, according to Rules 6, 12, 13, 14, 17 and 18, shall be as follows:

Nitro Proof Mark, London

As to the Gunmakers' Company: The letters "N P" surmounted by an arm dexter in armour, embowered, holding a scimitar, thus:

On arms of English make. On arms of foreign make.

Followed by the words "Not English Make"

Nitro Proof Mark, Birmingham

As to the Guardians: The letters "N P" surmounted by a crown, thus:

On arms of English make. On arms of foreign make.

Followed by the words "Not English Make"

41. The marks denoting the special proof according to Rule 18, shall be as follows:

Special Proof Mark, London

As to the Gunmakers' Company: The letters "S P" surmounted by a crown, thus:

Special Proof Mark, Birmingham

As to the Guardians: The letters "S P" surmounted by a crown, thus:

41A. The marks denoting the re-proof of old small arms shall be as follows:

Re-Proved Arms Mark, London

As to the Gunmakers' Company: The letter "R" surmounted by a crown, thus:

Re-Proved Arms Mark, Birmingham

As to the Guardians: The letter "R" surmounted by a crown, thus:

Position of provisional mark.—42. On barrels provisionally proved the provisional proof mark, as set forth in Rule 37, shall be impressed near the breech end.

Position of definitive marks.—43. On barrels for muzzle-loading arms of the First Class, which, according to Rule 6, require definitive proof only, the definitive proof mark and view mark, as set forth in Rule 38, shall be impressed upon the round near the breech end, and if a barrel is constructed with a patent breech the view mark shall be impressed.

44. On barrels for muzzle-loading arms of the Second and Third Classes the definitive proof mark and view mark, as set forth in Rule 38, shall be impressed above the provisional proof mark, and if a barrel is constructed with a patent breech the view mark shall be impressed thereon.

45. On barrels for single breech-loading arms of the Fourth, Fifth, Sixth, Seventh and Eighth Classes, the definitive proof mark and view mark shall be impressed in a convenient position near the provisional proof mark, and the view mark shall be impressed upon the action, body, shoe, breech block, breech bolt or chamber.

46. On barrels for double breech-loading arms of the Fourth, Fifth, Sixth, Seventh, and Eighth Classes the definitive proof mark and view mark shall be impressed upon the flat of each barrel at the breech end, or in a corresponding position when there are no flats, or at the request in writing of the sender, may be impressed upon the round of each barrel, and the view mark shall be impressed upon the action, body, shoe, breech block or blocks, breech bolt or bolts, chamber or chambers, with which the barrels are connected.

Position of mark for one proof only.—47. On barrels for arms of the Second and Third Classes, proved once only, according to Rule 6, the special definitive proof mark, as set forth in Rule 38, shall be impressed in the same position as the view mark occupies according to Rules 44 and 45.

Marking of revolving and repeating pistols.—48. On revolving arms of the Ninth Class the definitive proof mark and view mark shall be impressed upon the barrel and upon the revolving cylinder, and the view mark shall be impressed upon the frame or body of the action. On repeating pistols of the same class the definitive proof mark and view mark shall be impressed upon the barrel, and the view mark shall be impressed upon the action, body, shoe, breech block or blocks, breech bolt or bolts, with which the barrel is connected. When such arms are proved to cover the use of nitro powder they shall bear the additional mark "N P."

49. On barrels of military arms of the Tenth Class the special definitive proof mark, as set forth in Rule 39, shall be impressed upon the barrel, action, bolt or breech block.

Marking of nominal size of bore on all barrels.—50. On barrels for all arms, except those of the Ninth Class, the nominal size of the bore shall be impressed at definitive proof. This may be indicated by the number of balls to the pound, as 12, 16, 20; by decimal parts of an inch, as .577, .450, .303; or by millimetres, as 8-mm., 7-mm., 6.5-mm., as may be most convenient or most suitable.

Subdivision gauges for breech-loading shot barrels.—51. On barrels for arms of the Fourth and Eighth Classes, from 4 to 10 gauge inclusive, the gauges shall be divided into three parts, and the barrels shall be marked accordingly; thus the divisions of 8 gauge would be marked 8, $\frac{8.}{1}$ $\frac{8.}{2}$ From 11 to 17 gauge inclusive, the gauges shall be divided into two parts; thus the divisions of 12 gauge would be 12, $\frac{12}{1}$ and so on, as provided in Scale No. 4. The gauge size of the barrel shall be taken at a point nine inches from the breech end.

Chamber marks.—52. On barrels for breech-loading arms, the length of cartridge case in inches, shall be impressed following the definitive proof mark, as for example:

4th and 8th Classes.	5th, 6th and 7th Classes.
12 C 2½	360 3¼"; 97½ 2·6

Choke-bore mark.—53. On barrels for arms of the First, Second, and Fourth Classes, which are choke-bored, the word "Choke" shall be impressed following the definitive proof mark or the chamber mark.

Special definitive marking of rifles, Class 5.—54. On barrels for arms of the Fifth Class, which have received a special definitive proof as provided in Rule 11, the nominal size of the cartridge for which they are chambered shall be impressed near the definitive proof mark, followed by the weight, in grains, of the powder and bullet of the maximum service charge to be used, as for example: "360 14–134."

Definitive marking of rifles, Class 6, proved with nitro powder.—55. On barrels for arms of the Sixth Class, definitively proved according to Rule 12, the nominal size of the cartridge shall be impressed, followed by the special proof mark as set forth in Rule 40, the name of the powder used in proof, or a suitable abbreviation thereof, the weight, in grains, of the powder and bullet of the maximum service charge to be used, and an abbreviation of the word "maximum," as for example: "Cordite 75–480 Max."

Special definitive marking of rifles, Class 7.—56. On barrels for arms of the Seventh Class, definitively proved according to Rule 13, the special proof mark, as set forth in Rule 40, shall be impressed, in addition to the marks of provisional and definitive proof, followed by the words: "Nitro Proved."

Special definitive marking of shot and ball barrels.—57. On barrels for arms of the Eighth Class, definitively proved according to Rule 14, which are rifled through their full length, the letters "S & B," signifying shot and bullet, shall be impressed, following definitive proof mark or chamber mark thus: "S & B."

On barrels which are choke-bored, the word "Choke" preceded by the letter "R," signifying rifled choke, shall be impressed, following the definitive proof mark or chamber mark, thus: "R Choke."

On barrels which have been proved for larger service charges of powder than those set forth in Scale No. 4, the service charges shall be impressed, in drams or grains, as may be considered most suitable, following the above mentioned marks, as for example: "4 Dr. or 109 Gr."

Marking of breechloading shot barrels, and shot and ball barrels for use with nitro powders and shot.—58. On barrels for arms of the Fourth and Eighth Classes, the words "Nitro Proof," with the weight of the maximum service charge of shot to be used, shall be impressed in addition to the existing marks of provisional and definitive proof, as for example: "Nitro Proof 1 1/8."

Supplementary marking of shot and ball barrels, proved with nitro powder.—59. On barrels for arms of the Eighth Class, in which nitro powders are intended to be used with ball, proved under Rule 14, the same marks of proof shall be impressed as for the Sixth Class, followed by the name of

the powder used in proof, or a suitable abbreviation thereof, with the maximum weight, in grains, of powder and bullet of the maximum service charge to be used, and an abbreviation of the word "Maximum," as for example: "CORDITE 32—750 BULLET MAX."

Marking of large bore shot barrels.—60. On barrels proved according to Rules 22 and 23, the service charge shall be impressed in drams and ounces, near the proof and view marks.

Marking of barrels not provided for in rules and scales.—61. Barrels proved according to Rule 25 shall receive such mark or marks, in addition to the proof and view marks, as the Two Companies may consider necessary or most suitable.

Marking of foreign arms.—62. Barrels of foreign small arms or complete barrels and actions thereof, as hereinbefore provided for, in regard to other small arms, or in such manner as the Two Companies may consider most suitable.

Marking of re-proved arms.—63. Barrels of old small arms submitted for re-proof, having marks as hereinbefore provided for in regard to other small arms, shall be marked in such manner as the Two Companies may consider most suitable with the additional proof mark as set forth in Rules 32A and 41A.

64. Barrels of arms which have received a special proof as provided for in Rule 18 shall, when so required, bear the additional mark "S. P.," as set forth in Rule 41.

When choke-bored arms were first introduced in England, they were stamped thus:

London

Birmingham

Here the first figure (12B) indicates the gauge-classification (12) into which the weapon falls according to its bore diameter at the breech (B) (just ahead of the chamber), and the second (14M) that in which it is placed (14) by the bore diameter at the muzzle (M). This type of stamping is now obsolete.

A mark employed by the London Proof House prior to the adoption of the 1925 "Rules, Regulations and Scales," but rendered obsolete when these went into force, was a special stamp following a single (definitive) proof, thus:

Another early London mark, long superseded, and composed of three stampings conjoined, was the following:

FOREIGN-MADE barrels produced in countries having proof houses recognized as acceptable by the British Companies need not be reproved upon entry into England unless assembled into arms bearing the names of British makers, in which event they become subject to the usual British proof tests. Persons selling unproved arms or forging proof marks, are subject to fines of twenty pounds per weapon.

Apart from the proving of weapons for commercial sale, the British Government has always maintained its own system of proving and proof-marking weapons issued to its services. Thus, in addition to the broad arrow which indicates that the article upon which it appears is the property of the Crown, the current military proof stamp for rifles and automatic pistols is a crown surmounting the letters "G R" (Georgius Rex) (or a "V. R." for arms proved during

Victoria's reign, etc.), beneath which are two crossesd pennants over a letter "P" (proved). On military revolvers the broad arrow surmounting a crown is found on the frame, while the crossed pennants just described, appear on the cylinder and frame as well.

While the proving of gun barrels and actions is a highly desirable practice, and the international standardization of proof tests a consummation devoutly to be wished, it should be obvious that these do not serve to eliminate all possibility of accident. Arms may be tampered with after testing and stamping, metal being cut away from barrels and breeches in an effort to achieve extreme lightness of weight, only to result in the complete elimination of the factors of safety originally existing. Again, barrels or actions may give way because of the repeated use of excessive powder charges or of long continued corrosion, obstructions in the bore, etc. Nevertheless, the proof tests as today carried out in various European countries assure the purchaser of arms a degree of confidence in their soundness of fabrication which he would not otherwise enjoy.

Continental countries having established proof houses include Belgium, France, Spain, Germany, Austria, Hungary, Czecho-Slovakia, and Italy. In all of these save France, the proving of arms of domestic manufacture is obligatory. Indeed, much progress has been made toward the adoption of uniform proof regulations which will permit the recognition of the proof stamps of any one signatory by all other subscribing nations. An international convention to effect this was held in Brussels in July, 1914, and a reciprocal agreement on the subject entered into by some four countries (Belgium, France, Germany, and Italy) while others not officially represented (Austria, Hungary and Spain) have since agreed to adhere to it in principle. Unfortunately, before the document could be ratified the World War developed, and as a result its official adoption was long delayed, being finally consummated subsequent to a second convention which met in Brussells ten years later. It was officially ratified by Belgium in 1925, France in 1926, Germany in 1927, and Italy in 1928. In addition, Spain although not a signatory, has adhered to the provisions of the convention since 1923, as have Hungary and Austria since 1928. Czecho-Slovakia, the only other Continental country maintaining proof houses, has not as yet signified her adherence, and Great Britain has steadfastly held aloof. The agreement reached at the 1924 convention, reads as follows:

INTERNATIONAL CONVENTION FOR THE RECIPROCAL RECOGNITION OF PROOF MARKS ON FIRE ARMS

THE Governments of Germany, Belgium, France, and Italy, having recognized the advantage of concluding, upon the bases proposed by the International Technical Proof House Commission which met in Liége in May and June,

1911, a convention designed to establish uniform rules to be generally observed in the respective countries, and (to establish) official proof marks for fire arms, the undersigned, being duly empowered, have reached the following agreement:

Article 1: For measuring firing or proof pressures in sporting weapons, the proof houses will employ standardized instruments embodying the following characteristics:

A supporting block with screw closure on the Sauer system, and a firing mechanism including a safety attachment.

Cylindrical barrels in the usual sporting calibers, 70-cm. (28 inches) or more in length.

Chambers 65-mm. (2.56 inches) long, according to the dimensions currently in use in Great Britain and outlined in the table annexed (Table B).

Forcing cone 6-mm. long with corners not relieved.

Three crusher gauges of the French type, interchangeable on the barrels. Pistons 6.18-mm. in diameter on section; face area, 0.3 square centimeter; weight, approximately 3.27-grams.

On each barrel the axis of the first crusher gauge shall be 17-mm. from the breech, that of the second, 162-millimeters from the breech, and that of the third, 100-mm. from the muzzle.

The crusher cylinders (employed) shall be of copper 4.9 x 3.0 mm. in dimensions and will be supplied by the Central Laboratory of Powders and Nitrates at Paris.

Article 2: To measure firing or proof pressures in rifled muskets or carbines, the Proof Houses will employ standardized apparatus embodying features to be determined later by the Permanent International Commission on Small Arms envisioned in Article 7 of the present convention.

Article 3: For measuring firing or proof pressures in revolvers and automatic pistols, the Proof Houses will use standardized apparatus the characteristics of which will be determined under the same conditions as for the arms referred to in Article 2.

Article 4: A sample of each type of standardized apparatus will be placed in the Museum of Arts and Crafts, in Paris, to serve as examples of internationally standardized instruments.

Article 5: The contracting countries agree to recognize, as equivalent to the proof marks employed in their own national Proof Houses, the official proof marks of foreign Proof Houses whose regulations are not in conflict with the following:

A. The complete proof of a sporting gun will involve at least two tests, the first, a *provisional* proof conducted during the course of manufacture of the barrel, and a second, or *definitive* proof, applied after all parts of barrel and action have been machined to their final internal and external dimensions, or the entire arm finished in the white, or completely finished and ready for use.

B. For the definitive proof test, sporting arms may be classed as weapons designed, a—for use with black powder, or, b—for smokeless powder. A separate stamping will be employed to designate each of these categories.

C. For definitive proof of guns designed for black powder, the proof charge will be such as registers on the first crusher gauge of the standard apparatus a minimum pressure of: 620-kg. per square cm. for 12 gauge arms; 620-kg. per square cm. for 16 gauge arms.

D. For the proof of rifled shoulder arms, and of revolvers and pistols of various calibers, the cartridges used will develop a pressure exceeding by at least 30 per cent. the average determined by firing a sufficiently large series of commercial cartridges of their caliber and type loaded either with black or smokeless powder.

TABLE B: Minimum Standard Dimensions for Shotgun Chambers

Established by the "Gunmakers' Association" of London and adopted by the "Birmingham and Provincial Gunmakers' Association" and by British ammunition manufacturers.

Designation		Chamber			Recess for Shell Head		
Gauge	Nominal Length	Length	Diameter at Forward End	Diameter at Rear End	Diameter	Depth	Radius of the Arc
	Inches	Inches	Inches	Inches	Inches	Inches	Inches
4	4	4.000	1.035	1.090	1.200	0.130	0.030
8	3 1/4	3.250	0.914	0.930	1.035	0.115	0.020
10	3 1/4	3.250	0.845	0.861	0.933	0.074	0.020
10	2 7/8	2.875	0.845	0.859	0.933	0.074	0.020
12	3	3.000	0.800	0.815	0.886	0.074	0.020
12	2 3/4	2.750	0.800	0.813	0.886	0.074	0.020
12	2 1/2	2.560	0.800	0.812	0.886	0.074	0.020
14	2 1/2	2.560	0.763	0.775	0.847	0.068	0.020
16	2 3/4	2.750	0.732	0.745	0.815	0.062	0.020
16	2 1/2	2.560	0.732	0.744	0.815	0.062	0.020
20	2 3/4	2.750	0.685	0.698	0.766	0.060	0.020
20	2 1/2	2.560	0.685	0.698	0.766	0.060	0.020
24	2 1/2	2.500	0.649	0.661	0.728	0.060	0.020
28	2 1/2	2.500	0.614	0.626	0.688	0.060	0.020
32	2 1/2	2.500	0.562	0.574	0.636	0.060	0.099
410	2	2.000	0.465	0.475	0.537	0.060	0.015
360	1 3/4	1.750	0.415	0.424	0.479	0.050	0.015

Article 6: For sporting guns, each of the contracting countries will not grant its official recognition save to proof marks indicating *definitive* tests with black or smokeless powder, undergone by the arms when *complete and ready for use.*

Article 7: In order to make it possible to determine that the various Proof Houses are conforming to the preceding conditions governing their activities, and to continue to work toward improving and amplifying these, the contracting states agree to set up a commission designated as the Permanent International Commission on Small Arms at Brussels.

Since this convention of 1924, three others have taken place (in Brussels in October, 1929, in Liége in June, 1930, and in Paris in September, 1931. A fourth is scheduled for Rome in 1933). These sessions have been attended by delegates from the various signatories to the 1924 convention, plus official observers from Great Britain and Holland (1930) and Holland and Sweden (1931). Unfortunately, the United States has been represented on no occasion. Considerable progress has been made toward determining the specifications of crusher gauges to be used in testing shotguns, rifles, and pistols, the preparation of tarage tables, the proper dimensions for standard shotgun chambers, etc.

Proof Tests and Proof Marks

II: Continental Practices

By Calvin Goddard*

ALL proofs of Belgian-made arms are conducted at Liége, a manufacturing town in or near which are located the vast majority of Belgian producers of munitions. The proof house, presided over by Col. J. Fraikin, was established by royal decree in 1888. A list of Belgian makers of pistols and revolvers who were carried on its books in 1929, follows:

Firm:	*Address:*
(Formerly Mons. Clément) M. Neumann,	Rue Cheri 39, Liége;
Anciens Etablissments Pieper,	Herstal;
Ancion-Marx,	Rue Grandgagnage 28, Liége;
Baron-Wathelet,	Rue Cheri 33, Liége;
Bury, Antoine,	Rue Maghin 66, Liége;
Christophe, Julien,	Rue des Vignes 141, Liége;
Debouxtay, Diendomie,	Rue St. Leonard 449, Liége;
Delrez, Y.,	Rue J. B. Cools 42, Liége;
Dumoulin, F. & Cie.,	Rue Thier de la Fontaine 2, Liége;
Dumoulin, Demarteau,	Rue Chevaufosse 6, Liége;
Dumoulin, Lambert,	Rue St. Gilles 55, Liége;
Dupont, A.,	Rue de la Province 19, Liége;
Fabrique Nationale d'Armes de Guerre,	Herstal;
Francotte, Aug. et Cie.,	Rue Mt. St. Martin 61, Liége;
Galand, R.,	Rue Lamarck 115, Liége;
Grimard, Edgard,	Rue Louvrex 90, Liége;
Henrion Dassy & Heusschen,	Rue des Prés 8, Liége;
Janssen Freres,	Rue Fusch 42, Liége;
Joiris & Geurten,	Rue sur la Fontaine 88, Liége;
Leclercq, Léon,	Rue Dony 35, Liége;
Manufacture d'Armes Lepage,	Rue des Augustino 26, Liége;
Maréchal-Vervier,	Quai des Canneurs 35, Liége;
Mussen, Jacques,	Rue Pied ou Thiera Liége 51, Liége;
Nagant Freres,	Quai Heuvart, Liége;
Ory & Duquenne,	Rue St. Laurent 92, Liége;
Pirotte, Corneille,	Rue F. Ferrer 18, Herstal;
Pirotte, Y. & Fils,	Rue St. Laurent 47, Liége;
Robar et Cie.,	Rue Cheri 29, Liége;
Robiefow, P.,	Rue de Huse 19, Liége;
Rotsaert, L.,	Rue Dony 39, Liége;
Schroeder Freres,	Rue Simonou 8, Liége;
Société Anonyme Armaf,	Rue du Vertbois 84, Liége;
Société Anonyme Fabricants d'Armes Unies,	Rue Trappé 21, Liége;
Théate Freres,	Rue Trappé 5, Liége.

THE proving of arms at this institution is carried out according to the following regulations:

Weapons of Belgian make, of a caliber of 35-mm. or less, are placed in different categories according to the types of barrels with which fitted. These are classified thus:

Class 1—Muzzle-loading weapons firing one or more times;

Class 2—Breech-loading smooth-bored arms firing once or more;

Class 3—Low-powered weapons designed for short range target practice;

Class 4—Rifled arms of full, or short (carbine) length, firing once or more; rifled automatic arms; automatic carbines, machine guns, etc.;

Class 5—Arms of mixed boring (e. g. combination rifle and shotgun) of which at least one barrel fires a solid ball.

For weapons passing the proof tests satisfactorily, certificates of acceptance are issued.

Proof of Class 1.—In the case of single shot (muzzle-loading) weapons, this is carried out with charges of powder and shot varying in amount according to the caliber of the weapon, as outlined in Table C. (See page 226.)

Class 1 arms which successfully pass the proof tests are stamped as follows: A. On the barrel—1. The caliber, in tenths of a millimeter; 2. The mark of acceptance: 3. The countermark of the inspector (an initial surmounted by a star), thus: ; 4. The tower, , indicating inspection after assembly. B. On the permanent breech screw—1. The tower; 2. The countermark of the inspector. C. On special request by the maker, the proof of percussion muzzle-loading arms may be made with an excessive charge (the same as that for breech-loading arms of equal bore). Barrels so proved receive this stamp of acceptance, but before undergoing the test, must be fitted with their permanent breech screws.

Barrels for muzzle-loading arms may be subjected to an optional provisional proof. Such barrels must be in the rough-turned state, not assembled, and rough bored. Those passing the proof receive this stamp: Charges of powder and shot employed are as indicated in Table C.

Proof of Class 2 barrels (for smooth-bored breech-loaders) is as follows: 1. Optional provisional proof in the rough; 2. Obligatory provisional proof of the finished barrel; 3. Obligatory definitive proof of completed arm; 4. Optional supplementary proof with some special smokeless powder; 5. Optional supplementary proof with officially recognized smokeless powder.

DESCRIPTION of above tests.—1. This is identical with the provisional proof for muzzle-loading arms already described. Barrels to be in the rough-bored state and fitted with temporary breech screws. The mark of acceptance is also the same.

2. This applies equally to single-barrelled, double-barrelled, and multi-shot weapons. The barrel must here be finished to within 2/10-mm. of its final bore, but must not yet have been chambered.

Accepted barrels are calibrated between 15- and 30-cm. forward of the breech, and the figures so determined marked upon them (in tenths of a millimeter). If choke-bored, the word "Choke" is stamped additionally, while "Choke Rayé" appears on those which are both choked and partly or wholly rifled.

Loads for the ordinary provisional proof have been so devised as to develop pressures of 800 kg. per square centimeter, but on request of a maker, heavier ones may be employed. Charges used in the regular tests, as well as those in "double" and "triple" proofs, are shown in Table D.

Barrels accepted after the standard test receive the stamp: Those meeting the double proof are marked thus:

*Director of Research, Scientific Crime Detection Laboratory and Professor of Police Science, Northwestern University School of Law, Chicago, Ill. Lieutenant Colonel, Ordnance Reserve, U. S. Army. All drawings of proof marks in this series of articles were made by Esther Bohlman of Chicago.

Table C

Proof Charges for Smooth-Bored, Single-Shot, Muzzle-Loading Arms

Gauge		Proof charge		Gauge		Proof charge		Gauge		Proof charge	
Numerical designation	Designation in millimeters	Black proof powder, charge in grams	Spherical lead ball (weight in grams)(1)	Numerical designation	Designation in millimeters	Black proof powder, charge in grams	Spherical lead ball (weight in grams) (1)	Numerical designation	Designation in millimeters	Black proof powder, charge in grams	Spherical lead ball (weight in grams) (1)
1	35,0	156	236	9	20,4	27	44	23	14,8	10,5	16,5
	34,0	143	223		20,2		43	24	14,6		16
2	33,0	131	195		20,0		42	25	14,4		15
	32,0	119	177		19,8		40	26	14,2		14,5
	31,0	108	163	10	19,6		39	27	14,8	9	14
	30,0	98	148		19,4	24	38	28	13,8		13,5
3	29,0	88	132		19,2		37	30	13,6		13
	28,0	80	120	11	19,0		35	31	13,4	8	12
4	27,0	71	110		18,8	23	34	32	13,2		11,5
	26,0	64	96		18,6		33	34	13,0		11
5	25,0	56	86	12	18,4		32	36	12,8	7	10,5
	24,0	50	74		18,2	20	31	38	12,6		10
	23,8	48	72	13	18,0		30	40	12,4		9,5
	23,6	47	70		17,8		29	42	12,2		9
6	23,4	45	68	14	17,6		28	44	12,0	6	8,5
	23,2	44	66		17,4	17	27	46	11,8		8
	23,0	43	64	15	17,2		26	48	11,6		7,5
	22,8	42	62		17,0		25	50	11,4	5	7
	22,6	41	60	16	16,8		24	54	11,2		6,8
	22,4	40	58		16,6	15	23	58	11,0		6,5
7	22,2	38	56	17	16,4		23		10,8		6
	22,0	37	55	18	16,2		22		10,6	4	5,5
	21,8	36	54		16,0		21		10,4		5,5
	21,6	35	53	19	15,8	13,5	20		10,2		5
	21,4	34	52	20	15,6		19		10,0		5
8	21,2		50	21	15,4		18,5				
	21,0		49		15,2	12	18				
	20,8	31	47	22	15,0		17				
	20,6		45								

(1) Spherical ball of hardened lead of a diameter equal to that of the bore less 6/10 millimeter.

Table D

Charges Used in Provisional Proof of Breech-Loading Smooth-Bored Shotguns

Gauge		Charge for provisional proof					
		Ordinary		Double		Triple	
Nominal	In m/m.	Powder (1)	Shot (2)	Powder (1)	Shot (2)	Powder (1)	Shot (2)
		Grammes	Grammes	Grammes	Grammes	Grammes	Grammes
4	From 28,0 to 23,0	32	120	32	145	32	160
8	" 22,9 " 20,3	22	88	22	95	22	110
10	" 20,2 " 19,0	18	66	18	88	21,5	102
12	" 18,9 " 18,0	15	58	15	77	18	90
14	" 17,9 " 17,4	14	52	14	69	17	80
16	" 17,3 " 16,3	13	48	13	64	15,5	74
20	" 16,2 " 15,3	11	42	11	56	13	65
24	" 15,2 " 14,4	10	35	10	47	12	54
28	" 14,3 " 13,8	8,25	30	8,25	40	9,9	47
14 mm. to 32	" 13,7 " 12,4	7	27	7	36	7,7	42
410	" 12,3 " 10,2	4,5	16	4,5	21	5	24

(1) Black Proof Powder. (2) Soft head shot of 2½ mm. diameter.

Table E

Definitive Black Powder Proof of Breech-Loading Smooth-Bored Arms

Gauge		Proof charge		
Nominal (1)	Corresponding theoretical caliber in millimeters	For guns the length of whose chambers does not exceed the figures given below	Black proof powder	Soft lead shot of 2½ mm. diameter
			Grammes	Grammes
4	23,75	100 to 101,6 mm. (4")	23	110
8	21,21	80 to 82,5 mm. (3 1/4")	18	80
10	19,68	75 to 76,2 mm. (3")	13,5	60
12	18,52	70 mm. (2 3/4")	11,6	47,3
14	17,60	"	10,6	42,5
16	16,81	"	9,5	38,4
20	15,62	"	9	33,3
24	14,71	"	6,8	30,7
28	13,97	"	6,4	28
32	12,75	65 mm. (2 1/2")	5	22
410	10,41	"	3,3	14

(1) Guns and cartridges designated as of 4 gauge are in reality, 6 gauge.

while on such as pass the triple hazard there appears the same design with crossed laurel branches beneath:

3. Here the bore diameter before proving must not exceed that stamped upon the barrel at the provisional trial by more than 2/10-mm. (Should it do so, the first proof must be repeated.) The test is conducted with a black powder charge calculated to produce a pressure of 620 kg. per square cm., as outlined in Table E.

In the case of weapons with chambers exceeding the standard in length, increased pressures are produced by using larger charges of powder and shot, or by employing a stronger powder.

Weapons passing this test are stamped as follows:

On each barrel: 1. The nominal gauge and the length of the sporting shell adapted to its chamber, thus:

(i.e., 12 gauge; shell length, 70-mm.). 2. The acceptance mark: 3. The countermark of the inspector who has examined the arm:

On the lugs of the action, if these are not forged integral with the barrel, the tower:

On the action: 1. The tower: 2. The countermark of the inspector:

Special (optional) *smokeless powder tests* may be conducted as follows: 1. The test known as "Smokeless powder-standard." 2. Tests with other smokeless powders officially recognized. (Weapons submitted for such tests must be in the finished and assembled state—at least "in the white," i.e., completed and with metal parts polished and shining, ready for blueing, browning, or nickeling.)

The standard smokeless powder test is conducted with a powder which must meet the following specifications: 1. It must be of such density that when loaded into a 12-gauge paper shell 65-mm. long (2.6-inch) with 36 grams of No. 7 shot, and crimped, it will seat normally without undergoing compression. The amount of the charge must be such as to produce a maximum average pressure, over a series of twenty rounds, as taken with an international standard pressure gauge, of between 850 and 900 kg. per square cm.

In this series, pressures must not fall below 800 kg. or exceed 975 kg. Those measured on the second crusher must run between 200 and 300 kg. (In gauges below 16, the standard accepted pressure is 1000 kg.; in 16 and above, it is 900 kg., while for arms with extra long chambers, figures of 1000 kg. are required in 16 and larger gauges, and 1100 kg. in the smaller sizes.)

The proved arm is stamped thus: 1. On each barrel as well as on the locking mechanism the mark: 2. On the flat side of the barrel, its weight in grams.

Tests with smokeless powders not officially recognized.—1. Arms submitted must first have undergone the standard smokeless powder test above described. 2. Powders used in this special test include: Belgian—Clermonite, Mullerite, Coopal (in grams and discs); English—EC3, Amberite, Ballistite; French (official) J, S, M, R, and T. (Other powders, if officially recognized in Belgium may be substituted for the above.)

Charges employed are those which will give maximum pressures (in a shell of correct chamber length) not exceeding those developed by loads of standard smokeless powder under similar conditions. Accepted arms receive on barrel and action a stamp combining the Belgian lion with the abbreviated commercial designation of the powder employed, thus:

PROOF of barrels of Class 3 (for target arms of low power).—These undergo but a single test, made when they are entirely finished in the white and fitted with locking, hammer, and trigger mechanisms. A cartridge of standard caliber, completely filled with black proof powder (superfine) and loaded with a service type bullet is employed. The stamps used are as follows: 1. On the barrel, if rifled, a crown and R: 2. The commercial designation of the cartridge to which adapted, thus: "Fl. 6" (i. e. 6-mm. Flobert), "22 C." (i. e. 22 center fire), etc.; 3. The mark of acceptance: 4. The tower: 5. The countermark of the inspector, e. g.: 6. On the action, the tower and the inspector's countermark.

Proof of barrels of Class 4 (rifled muskets, carbines, rifled automatic arms, automatic carbines, machine gun).—This consists of a single (definitive) obligatory test, with either black or smokeless powder. The barrel and action must have been machined to final dimensions. Three rounds per barrel are fired. The first of these is calculated to develop a pressure 30 per cent above the strongest standard commercial load of the same caliber and carrying the same bullet. The second and third are with ordinary stock ammunition. The following stamps are employed: 1. On the barrel, the mark: 2a. The stamp "B. Plomb" (i. e. "ball of lead") if the cartridge for which it is chambered carries a lead ball, and 2b. The stamp "B. Blindee" (i. e. "ball jacketed") if the routine load calls for a jacketed bullet; 3. The commercial designation of the cartridge for which it is adapted, as: "450 EXPRESS"; 4. The mark of acceptance: 5. The countermark of the inspector: 6. If the test be made with smokeless powder, the arm will receive in addition the stamp: on the barrel and principal units of the breech mechanism.

At the maker's request, barrels of the above class may be submitted to a facultative provisional proof. This is carried out when the piece has been finished, chambered, and bored to within 2/10-mm. of its final diameter, but *not* rifled, breeching being supplied by a temporary breech screw. The proof charge is twice that of black powder which may be contained in a standard shell of the caliber to which the arm is adapted, the slug being a leaden cylinder weighing one and one-half times as much as the service bullet. Accepted barrels are marked: 1. 2. With the inspector's countermark:

Barrels so provisionally proved are tested definitively with a single charge developing 30 per cent more pressure than a standard commercial load.

Proof of barrels of Class 5 (for ball and shot).—Rifled barrels undergo the tests outlined for those falling in class

four, while those bored smooth are tested according to the regulations laid down for class two.

Proof of arms with short barrels.—For proof classification, these are grouped as follows: 1. Revolvers; 2. Automatic pistols; 3. Pistols chambered for Flobert cartridges or for revolver cartridges; 4. Break-open pistols for bird shot cartridges, and 5. Muzzle-loading pistols.

1. *Proof of Revolvers.*—These are tested, when finished in the white, with either black or smokeless powder, as many rounds being fired as may be contained in the cylinder of the arm. Specifications for black powder test cartridges include: 1. The standard shell adapted to the weapon under test; 2. A charge of superfine black test powder entirely filling the shell, but not to develop a pressure more than 30 per cent in excess of a standard commercial black powder load in the same case; 3. The standard ball for which the arm is chambered. Specifications for smokeless powder test loads, require loads to develop pressures 50 per cent greater than those produced by similar commercial loads.

After testing, revolvers are stamped thus (*black powder proof*): 1. Either on barrel or frame, at some point clearly visible, the abbreviated designation of the cartridge; 2. On the barrel, the countermark of the inspector, Ā, also (if rifled); 3. The stamp: ♔ R 4. On the principal components of the frame, the countermark of the inspector: Ā 5. On the cylinder, the mark of acceptance E L.G. and the inspector's countermark Ā *Smokeless Powder Proof:* The same stampings plus ♔ P.V on barrel, frame, and cylinder.

2. *Proof of Automatic Pistols.*—This is carried out exclusively with smokeless powder and involves the firing of three rounds loaded as are the smokeless loads for revolvers (i e. to produce pressures 50 per cent above normal), the arm being finished in the white. Stamps used are: On the barrel (a) the mark: ♔ P.V (b) The acceptance stamp: E L.G. (c) The inspector's countermark: Ā (d) On the principal components of the frame, the mark ♔ P.V (e) The inspector's countermark: Ā (f) On the barrel or frame, and plainly visible, the commercial designation of the cartridge, as: "Cal. 7.65"; "Cal. 6.35"; etc.

3. *Proof of Pistols chambered for Flobert or revolver cartridges.*—Such pistols, whether of the hinged frame (break-open) type or not, with one or two barrels, and finished in the white, receive the following test: One cartridge, loaded as prescribed for the black-powder revolver proof (i. e. to develop a 30 per cent excess pressure) is fired. Accepted pistols are marked on the barrel with: 1. The acceptance stamp: E L.G. 2. The tower: 3. The inspector's countermark: Ā Also, 4. ♔ P.V when smokeless powder is used and, 5. ♔ R when the barrel is rifled. On the lever or frame, we find: 1. The tower: 2. The inspector's countermark: Ā and 3. The ♔ P.V —(after proof by smokeless powder).

4. *Proof of hinged-frame (break-open) pistols of 12-mm. bore or less, adapted to shot cartridges.*—Such (smooth-bored) pistols with one or two barrels and 12-mm. (410 caliber or 36 gauge) bore or less must undergo two proofs according to the same standards as laid down for smooth-bored breech-loading shotguns of corresponding calibers. After proving, they are stamped exactly as are shotguns of equal bore.

5. *Proof of Muzzle-loading pistols.*—Single- and double-barrelled muzzle-loading pistols are proved and stamped exactly as are muzzle-loading shotguns. When rifled, they receive the additional mark: ♔ R

PROOF of weapons to be issued to regularly armed military forces.—These are proved according to instructions laid down by the accredited military commission from the nation involved, provided these stipulate pressures at least 30 per cent in excess of the standard for long barrelled arms, and 50 per cent in excess for pistols and revolvers. Stampings include: 1. On the barrel—(a) The acceptance mark: E L.G. and (b) The inspector's countermark: Ā 2. On the principal parts of the action, the inspector's countermark: Ā When the interested nation stipulates no tests, or inadequate ones, the official Belgian proofs for arms of the type involved are applied.

Signal Pistols.—Such pistols using paper shot shells are subjected to a single test, identical with that obtaining for black powder sporting guns taking the same cartridge. After proving, they are marked thus: 1. On the barrel (a) The nominal caliber of the chamber, as: 12-65 (b) The acceptance mark; and (c) The inspector's countermark. 2. On the action, the inspector's countermark:

Proof of Subcaliber tubes.—Those chambered for Flobert 6-mm. or smaller calibers require no proof. Those for other cartridges are proved and stamped exactly as are the barrels for small weapons of similar calibers.

Proof of Revolvers with extension stocks (revolver-carbines).—These are proved just as are revolvers of the same calibers.

Proof of Imported Small Arms of calibers of 35-mm. or less.—Proof marks of countries signatory to the International Convention of 1914, as well as of others recognized as satisfactory by Royal Belgian Edict, are accepted without further test. Such acceptance includes marks originating in England, France, Germany, Hungary, Italy, and Spain. Unproved weapons of foreign make must be submitted to the Liége proof house for testing within fifteen days after their importation. They then receive the definitive test applicable to arms of the class into which they fall, and are stamped on the barrel and principal parts of breech and action with the special mark: (S) reserved for this purpose.

Unfinished arms to be exported in the white and finished and tested in another country.—These must be submitted to the Liége Proof House where it is ascertained that they bear the provisional mark of the foreign proof house to which they are to be sent. They are then stamped on the barrel with the Belgian lion in reverse: and returned to the makers.

This regulation applies to pistols and revolvers as well as to long arms (shoulder weapons).

Caliber Designations.—Caliber is indicated: 1. For muzzle-loading arms, by a stamp giving their bore diameter at the muzzle. 2. For breech-loading shotguns and for pistols shooting small shot cartridges, by a stamp showing the bore diameter as taken between fifteen and thirty cm. ahead of the breech, and by another giving chamber dimensions, thus:

3. For rifled arms—by a stamp showing the commercial designation of the cartridge.

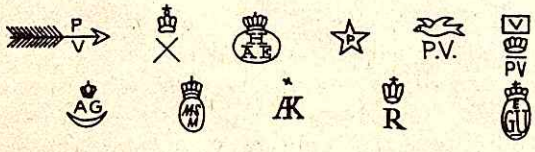
Powders used in Proof Tests.—1. Smooth-bored arms, whether muzzle- or breech-loading, are tested with black powder of the following specifications: 1. Density 0.940-0.950; 2. Pressure (developed by a charge of 11.6 grams of powder and 47.3 grams of shot of 2.5-mm. diameter, as taken with an international pressure gage No. 6 on a 12 bore gun), must vary between: 620 kg. per square cm. (± 5 per cent) at the first crusher, and: 410 kg. per square cm. (± 5 per cent) at the second crusher. The mean pressure in a series of ten rounds must run between 600 and 640 kg. at the first crusher, and 400 and 430 at the second. The velocity of the shot charge at fifteen meters as measured on a Boulengé chronograph must run between 290 and 300 ms. over a series of ten rounds.

Superfine Black Powder, for testing rifled arms in general, and also for short-barrelled weapons.—This must be so constituted that, when 3.5 grams of it are loaded into a Belgian Mauser cartridge, model '89, the pressure developed will be 2170 kg. per square cm. ± 5 per cent, while the remaining velocity at 25 meters of a standard Comblain rifle bullet fired by 5.1 grams of this powder must run 435 ± 5 meters.

A mark formerly used at Liége for definitive proof is thus:

, while stamps indicating proofs with smokeless powders not previously illustrated are

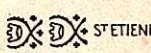
and

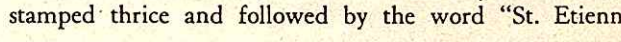
The foregoing comprehensive descriptions of the proving of arms in England and Belgium should serve to give the reader a fairly concise idea of continental proof practices, and since these have been closely standardized by the adoption of the International Convention of July 15, 1914 (see Part I of this series of articles, Army Ordnance, November-December, 1933, Vol. XIV, No. 81, page 147), there appears little need of going so extensively into the regulations prevailing in other European countries. It is worthy of note, however, that this convention was designed, among other things, to put an end to abuses which had arisen, in the form of stampings bearing a general resemblance to the proof marks of certain countries, but which, on careful scrutiny, proved to be faked imitations made to trap the unwary. Thus we find, in an article by Colonel Fraikin (*L'Industrie Armurière au pays de Liége. Bulletin trimestriel de la Société d'Expansion Belge, July, 1914, pp. 48-55*) illustrations of some ten such stampings which he ascribes to Spanish makers anxious to trade upon Belgium's good name by producing marks in imitation of her's. 

Indeed, arms bearing these or other spurious proof marks are not unusual, and the uninformed expert is likely to accept them as genuine indication that they have been subjected to some standard test, unless he be familiar with all the genuine marks used in the various European countries.

Proofs in Countries Other Than England and Belgium

As already indicated, the proving of arms in France is left to the volition of the maker, and is not obligatory. The tests are carried out at two different places—St. Etienne, a name long associated with the production of small arms (its proof records go back to 1700—possibly earlier) and Paris. As in the case of the two British proof houses, the two cities have their own distinctive markings which they apply to arms meeting their test requirements. These are as follows ("Rules and Regulations, Public Proof House, Chamber of Commerce of St. Etienne"): 1. Provisional proof for separate (shotgun) barrels: a crown thus: The Paris mark thus: 2. Definited proof of barrels finished and assembled; the arms of the city of St. Etienne followed by the word "St. Etienne":

The Paris mark thus: 3. *Double* proof of barrels finished and assembled, the arms of the city of St. Etienne, repeated, and followed by the word "St. Etienne": 

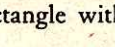
The Paris mark thus: 4. *Triple* proof of barrels finished and assembled; the arms of the city of St. Etienne, stamped thrice and followed by the word "St. Etienne": 

5. Standard black powder proof of finished arms (at 620 kg. pressure)—the letter F surmounted by a crown:

The Paris mark thus: 6. Special black powder proof of finished arms (at 800 kg. pressure)—the letter S surmounted by a crown:

The Paris mark thus: 7. Standard smokeless powder (*"poudre T"*) test of finished arms (at 850 kg. pressure) the letters PT surmounted by a crown:

The Paris mark thus: P.T. 8. Same test with powder "J" and "M": P.J. P.M. 9. Special smokeless powder (*poudre "T"*) test of finished arms (at 1,100 kg. pressure) the letters PT surmounted by two crowns:

10. Supplementary stamping placed upon arms tested when ready for sale and delivery; four forks of lightning emanating from a single point and forming a rectangle: 11. Additional stamp designed to indicate arms of standard dimensions; the word "normal" enclosed in a rectangle with rounded corners: 

12. Supplementary stamp placed on arms of foreign make; the words "arme etrangere" surrounded by a rectangle with rounded corners:

13. Proof of rifled shoulder

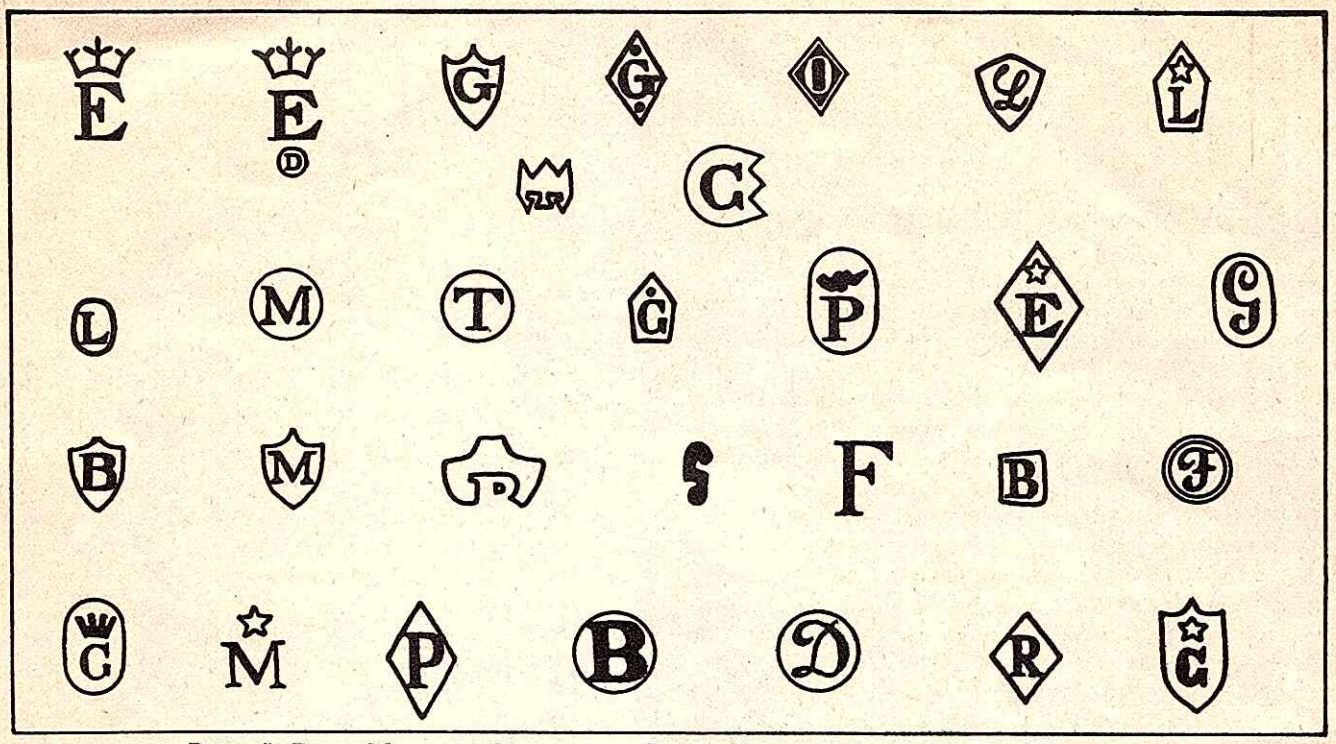


PLATE I: PROOF MARKS ON CURRENT AND RECENT ARMS OF THE FRENCH GOVERNMENT.

arms; the letters AR surmounted by a crown and followed by the word "St. Etienne": AR ST.ETIENNE 14. Proof of hand weapons, a crown, duplicating, but in reduced size that used in proof 1, above, and followed by the word "St. Etienne": ST.ETIENNE The 1902 edition of the rules and regulations of the St. Etienne proof house lists two stampings not found in the later issue (1928). These formerly appeared on finished but non-assembled barrels, the first after ordinary, and the second after double, proof. They are: 15. Single proof of barrels finished but not assembled; the arms of the city of St. Etienne followed by the letters N.A. and the word "St Etienne": DNA ST.ETIENNE 16. Double proof of such barrels:

DNA ST.ETIENNE

Powders used.—For black powder tests of unassembled barrels "No. 2 Strong"; for black powder tests of finished arms "Extra-fine"; for smokeless powder tests—*"Poudre T"* (powder T).

Shot employed.—No. 8 metric.

Other marks formerly applied to arms proved at St. Etienne include ST.ETIENNE AVE F

AF is a mark used on French government-made arms, while illustrates one placed on foreign-made arms proved at St. Etienne.

Special marks at one time placed on weapons produced in other French towns were: Sailleville— ; Chatellerault—a capital E; Mutzig, a capital E surmounted by a star Tulle—a crown above the letter E

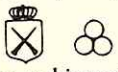
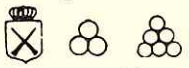
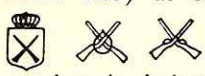
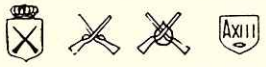
French government arms now bear a crown above the letter E, the crown differing from that used by Tulle (see the first drawing in Plate I). Other marks found on French government arms of current or recent vintage constitute the remaining illustrations in Plate I.

Proof Tests and Proof Marks

III: Continental Practices (Continued)

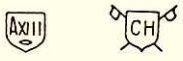
By Calvin Goddard*

SPAIN.—The establishment of proof houses for the testing of weapons of Spanish manufacture was decreed by a law enacted on January 31, 1915. Eibar, center of the country's arms industry, was properly chosen as the site of one of these while Barcelona claims another. But it would appear that there was considerable delay in placing the project on a working basis, for many Spanish pieces imported into the United States during the years immediately subsequent to 1915, lack the stampings which later appeared on arms arriving from that country.

In substance, the proof regulations obtaining at the Eibar Proof House when I visited it in 1929, were as follows: 1. Single barrelled, muzzle-loading shotguns undergo a single (definitive) test with black powder at 900 kg. pressure per sq. cm. and receive the following proof stampings:  2. Double barrelled muzzle-loading shotguns are subjected to two tests, provisional and definitive (both with black powder) at the same pressure. The marks used to indicate acceptance are:  3. Single barrelled, breech-loading shotguns are tested but once (with black powder) and at a lower pressure (620 kg. per sq. cm.). They are then stamped as follows: 4. Breech-loading shotguns of two or more barrels receive a provisional (black powder) proof at 900 kg. per sq. cm. and a definitive proof (black powder also) at 620 per sq. cm. being stamped thus:  5. Breech loading shotguns of two or more barrels designed for smokeless powder receive three proofs, the first two with black powder, under the same conditions as outlined for item 4 above, and the third with smokeless at a pressure of 850 kg. per sq. cm. They can then receive the following marks: 

6. When a *special* smokeless proof is requested, breech-loading shotguns receive four tests, i. e. provisional, definitive, and supplementary (as outlined in item 5) and a *sur*-supplementary, in which "Diamond" smokeless powder is employed at a pressure of 900 kg. per sq. cm. In this case the stampings are:

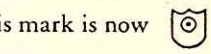
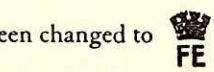
For single-barrelled arms.

For double-barrelled arms 

7. Rifled shoulder weapons are proved provisionally with black powder charges developing 900 kg. per sq. cm. and definitively with a metallic cartridge so loaded as to develop pressures 30 per cent in excess of standard commercial loads. Stampings are 8. Rifled carbines (short shoulder arms) receive a single proof at pressures 30 per cent in excess of the commercial, and are marked: 9. Revolvers receive a like proof (pressure 30 per cent above standard) being stamped: 10. Automatic pistols are similarly treated, and bear the same markings:

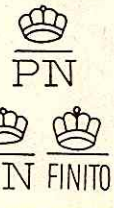
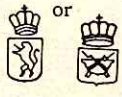
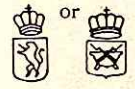
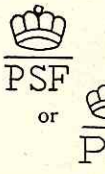
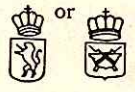
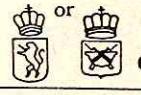
Certificates are issued to indicate that the arm described has passed the usual proof tests.

In December, 1929, a royal decree established a new set of official stampings pictured below. It will be evident that some of these are identical with those just shown, while others are variants of these, and still others are newly added. 1. Mark of acceptance for all arms: Eibar Barcelona 2. Definitive proof mark for smooth-bored muzzle-loading arms of one or more barrels, assembled: 3. Provisional proof mark for breech-loading, smooth-bored arms and smooth-bored automatic arms: 4. Definitive proof mark for the above arms: 5. Mark for the single definitive proof applied to rifled carbines and muskets, whether automatic or not: 6. Mark for the single definitive proof of low powered target pistols and carbines: 7. Mark for the single definitive proof of non-automatic pistols: 8. Mark for the definitive proof of revolvers: 9. Mark for the definitive proof of automatic pistols: 10. Mark indicating, for all arms, that they meet the required tolerances: 11. Mark for the supplementary proof of breech-loading shotguns and automatic shotguns: 12. Mark for the second supplementary proof of breech-loading shotguns and automatic shotguns: 13. Mark employed for definitive proof of foreign-made arms:

Some of the above have been declared obsolete by the present Spanish Republican Government, and replaced by the following: 1. The official Eibar acceptance mark is now while the official Barcelona mark of acceptance is Nos. 2 to 6. No change; 7. This mark is now  Nos. 8 and 9. No change; 10. This has been changed to 

*Director of Research, Scientific Crime Detection Laboratory and Professor of Police Science, Northwestern University School of Law, Chicago, Ill. Lieutenant Colonel, Ordnance Reserve, U. S. Army. All drawings of proof marks in this series of articles were made by Esther Bohlman of Chicago.

Table of Obligatory Tests and of Proof Marks Employed by
THE NATIONAL SMALL ARMS TESTING BUREAU OF ITALY

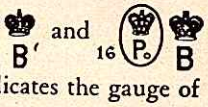
TEST			Proof Pressures in Kilograms per Square Centimeter	MARKS USED			NOTES
No.	Cal.	Objects Tested		Facsimile		Location	
				Identifying mark. Crest of the district in which the bureau is located, surmounted by the royal crown.			To be placed on all arms and barrels passing the tests.
				Brescia	Gardone		
1	A	Powder—Black or smokeless. Barrels—Unassembled.					Pressures, proof marks, and number of test shots to be the same as for completed arms of corresponding types.
2 3	B C	Powder—Black. Guns—Muzzle-loading. a. Finished in the white. b. Finished completely.	620			barrel, lock and frame	
4 5	D E	Powder—Smokeless. Guns—Smooth-bore, breech-loading. a. Finished in the white b. Finished completely.	900* for 16 gauge or larger 1000* for gauges smaller than 16			barrel and action	This test calls for 2 shots per barrel. The pressure of the 1st test shot is such as to insure, for the resistance of the barrel at about 16 cm. forward of the breech, a margin of safety equal to or greater than that fixed for the breech when tested at 900 to 1000 kilograms per square centimeter.
6	F	Powder—Black or smokeless. Arms—Rifled.	To exceed by 30-50% the pressure developed by the most powerful cartridge in general use and not deemed dangerous.			Barrel, lock, slide, and cylinder	Weapons to be subjected to this test must be completely finished. In the case of short arms, the test pressure is indicated on the record card delivered with each one proved.
7	G	Powder—Black or smokeless. Arms—Sporting pistols.					Pressures and proof marks identical with those for sporting guns, but one shot only per barrel.
8	H	Powder—Black. Weapons—Small cannon.	That of the normal charge increased by 30%			Barrel and lock.	Weapons to be in completely finished state before being tested.

*For guns with chambers not longer than 70-mm. When longer, pressures are increased proportionately.

11. This is at present Nos. 12 and 13. No change.

Still other Spanish proof marks are found listed in the "Rules and Regulations of the Leigé Proof House," published in 1924, which shows cuts of the stampings used in several different countries. One which we have not already described and illustrated, is the: mark placed on *rifled* muzzle-loading guns after their single definitive proof

Additional Spanish proof marks which we have not described are: 1. That used for the single definitive proof of breech-loading shotguns , and 2. That stamped on arms which have undergone a special proof with an excessive overcharge **E**

Major H. B. C. Pollard, in his "Book of the Pistol," shows two other Eibar proof marks, which evidently antedate any that I have illustrated. They are and  In the latter, the figure 16 presumably indicates the gauge of the gun so marked.

ITALIAN PROOF HOUSES.

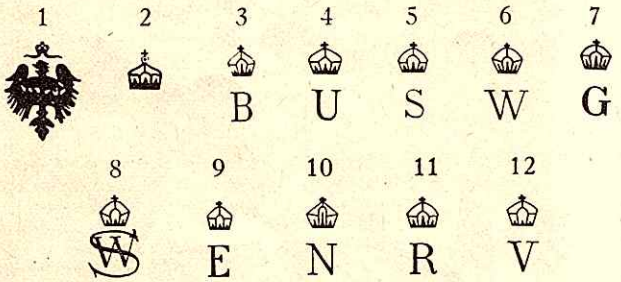
SHOT GUNS

Provisional Proof of barrels	Definitive Proof with Black Powder		Definitive Proofs with Smokeless Powder	
	Of the arm finished in the white.	Of the arm completely finished.	Of the arm finished in the white.	Of the arm completely finished.
	PN	PN FINITO	PSF	PSF FINITO

RIFLED ARMS
(Rifles, Pistols, Etc.)

ITALY.—Here again we find two proof houses, one at Brescia and one at Gardone. Each, as usual, has its individual stampings. These are illustrated and described in the table on the preceding page and show stampings current in 1929. These differ in some respects from those printed in the 1924 edition of Italian Proof Rules, which are shown in the table above.

GERMANY.—In Germany we find twelve basic proof stampings now current. These are reproduced below and numbered in sequence. They are applied as follows:



(A) Smooth-bored, muzzle-loading shoulder arms carry stamps 1, 1 plus 4, and 5, on barrel, and 1 plus 4 on breech, or 3 and 4 on both barrel and breech. (B) Smooth-bored, breech-loading shoulder arms, bear the marks, 1, 1 plus 4, and 5 on barrels, if cylinder bored. If choked, these are stamped 1, 1 plus 4, and 6. In either case, the action will show stampings 1 plus 4. (B-1) Barrels of choke-bored, breech-loading shotguns, which are rifled in their choked portions, are stamped with 1, 1 plus 4, 6 and 8, the action being marked as in the preceding case (with 1 plus 4). (C) In some instances, smooth-bored shoulder weapons (excepting choked arms) and carbines may bear stamps 3 and 4 only on the barrel, and the same on breech or action. Under similar conditions, military carbines, such as the Mauser 1888, may show only marks 2 and 10 upon the barrel as well as upon the receiver. (D) Revolvers carry stampings 2 and 4 upon barrel, cylinder, and frame. (E) Repeating and target pistols show marks 2 and 4 on barrel and frame. (F) Arms once proved and stamped, which later undergo some modification necessitating their reproving, will exhibit, after such reproof, marks 11 and 3 on the barrel, breech, or action, in addition to those which it received when first proved. (G) Following the passage of the German proof regulations of 1891, arms then already completed and ready for sale were allowed to be sold without molestation if imprinted with the stamping No. 12 on barrel and breech or action.

Approaching the subject from another angle, the various German proof marks have the following significance: No. 1—This is placed upon barrels which have passed the first (provisional) proof. No. 1 plus No. 4—This combination appears on barrels and actions to indicate that they have passed the second (definitive) test. No. 2—This stamp is found on pistols and revolvers which have passed the single proof required of such arms. No. 3—This shows on such rifles and shotguns as undergo but a single proof test. No. 4—This does not appear to be used save in conjunction with stamping No. 1 (*vide supra*). No. 5—This is imprinted on smooth-bored (shotgun) barrels. No. 6—This appears on choke-bored (shotgun) barrels. No. 7—This is used upon rifled shoulder arms. No. 8—This is practically a combination of 5 and 6, and shows on choke-bored shotguns the choked sections of which are rifled. No. 9—This is reserved for "express" rifles. No. 10—This stamping, or the word "NITRO" in its place, indicates that the arm has been tested with smokeless powder. No. 11—This appears on arms reproved after modification. No. 12—This was used on arms already completed, but unsold, after passage of the proof laws of 1891.

In addition to these twelve stampings, we find others, paralleling closely those used in England, and for the most part self-explanatory. Thus: "St. M. G."—means adapted for *Stahlmantelgeschoss* (i. e. steel-jacketed bullets). And in Germany, steel-jacketed *means* steel jacketed, although of late years gilding metal has begun to replace steel as a jacket material in that country. Again, "K. M. G." indicates *Kupfermantelgeschoss* or a barrel designed for copper-jacketed missiles, while "B. L. G." stands for *Bleigeschoss*, or one intended for lead bullets only. Shotgun barrel calibers or gauges are stamped upon them in figures as for instance "24" indicating 24 gauge. Chamber calibers are designated by numbers surrounded by a circle as: the number 12 in a circle indicates 12 gauge. In rifles, caliber number appears in figures, thus "99.70," while caliber plus shell length (a common German usage) is shown thus $\frac{9.3\text{-mm}}{82}$. Here the "9.3-mm." indicates the diameter of the bullet, and the figure "82" indicates under this usage the length of the shell in millimeters.

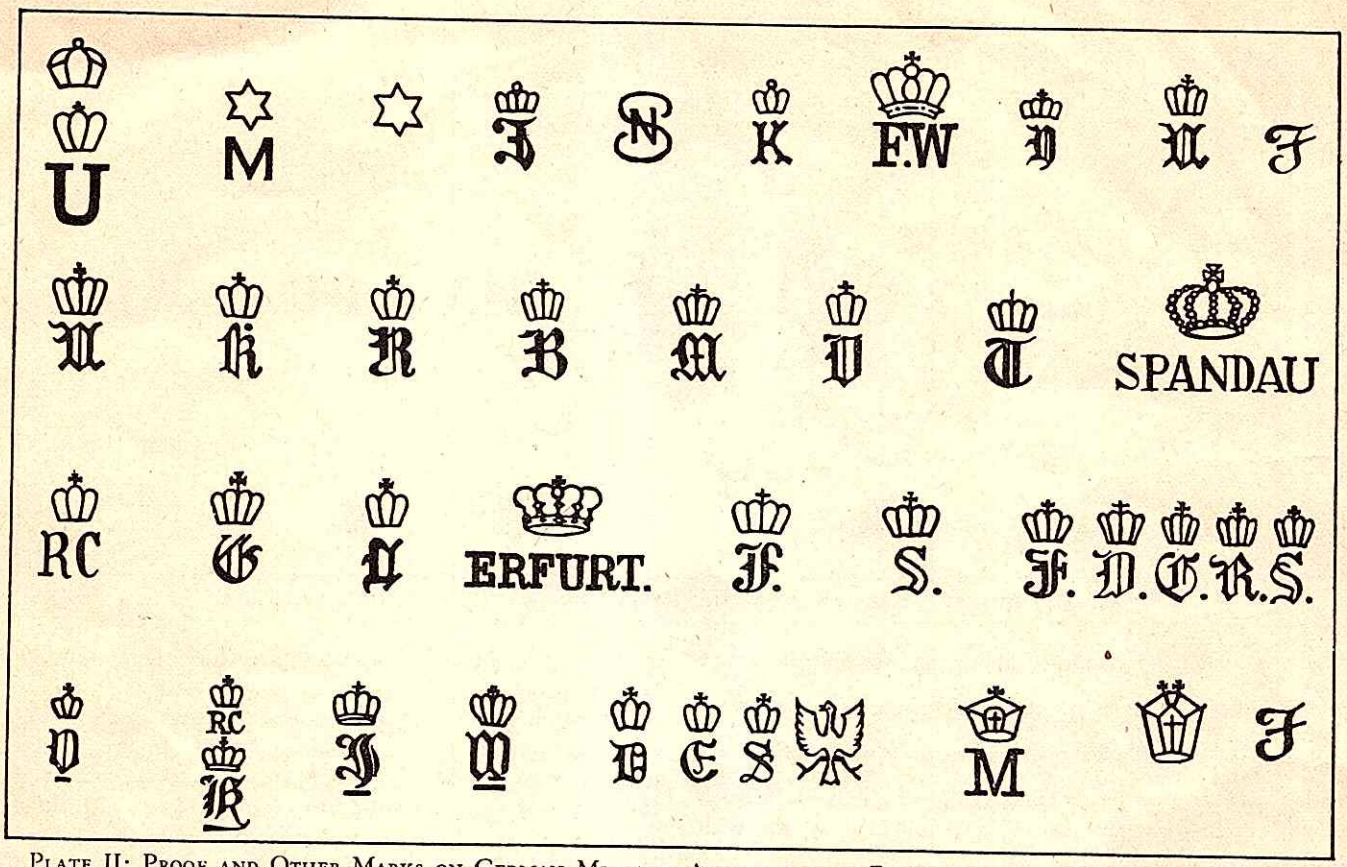


PLATE II: PROOF AND OTHER MARKS ON GERMAN MILITARY ARMS FROM THE FRANCO-PRUSSIAN WAR TO THE PRESENT.

Plate II illustrates an assortment of proof and other stampings found on German military arms dating from the Franco-Prussian War to the present time.

AUSTRIA.—Like France and England, Austria has two proof houses, one at Vienna (spelled "Wien" in German) and one at Ferlach. Their proof marks, and the conditions under which they are applied, are as follows:

	Vienna	*Ferlach*
Following the first proof on single barrelled shotguns		
Following the second proof on double barrelled shotguns		
Following the third proof on multi-barrelled guns, the second proof on single barrelled arms, and the one and only proof on revolvers, pistols, and small-bore weapons.....		
Following proof with smokeless powder		

HUNGARY.—The single Hungarian proof house at Budapest, employs, like the Austrian houses, four sets of stampings, conditions precedent to which are identical with those obtaining in Austria (q. v.). The marks are:

CZECHOSLOVAKIA.—Prior to the passage of the law of December 17, 1931, the two Czechoslovakian proof houses at Prague ("Praha" in Czechoslovakian) and Weipert ("Vyprty") used the markings shown below, based on exactly the same tests as previously described for Austria (q. v.) and Hungary. Indeed, the great similarity between the stampings imprinted after the smokeless powder proof at all five houses (Vienna, Ferlach, Budapest, Prague, and Weipert) would indicate the probability that, prior to the breaking up of Austria-Hungary at the close of the World War, there existed, as might be expected, a close relationship between all of these organizations. The marks follow:

Prague: .....

Weipert: .....

(Mahrholdt shows different stampings for the 3d (definitive) proof at both Prague and Weipert, thus —Prague and —Weipert.)

It would appear that the law referred to (that of December 17, 1931) established a single set of proof marks to be employed both at Prague and Weipert. These are:

1. This is the stamping placed upon shotgun barrels rough bored and not assembled, following (voluntary) provisional proof.

2. This appears on completed and assembled shotgun barrels after their (obligatory) provisional proof.

3. This is found on shotguns which have passed the (obligatory) definitive proof with black powder.

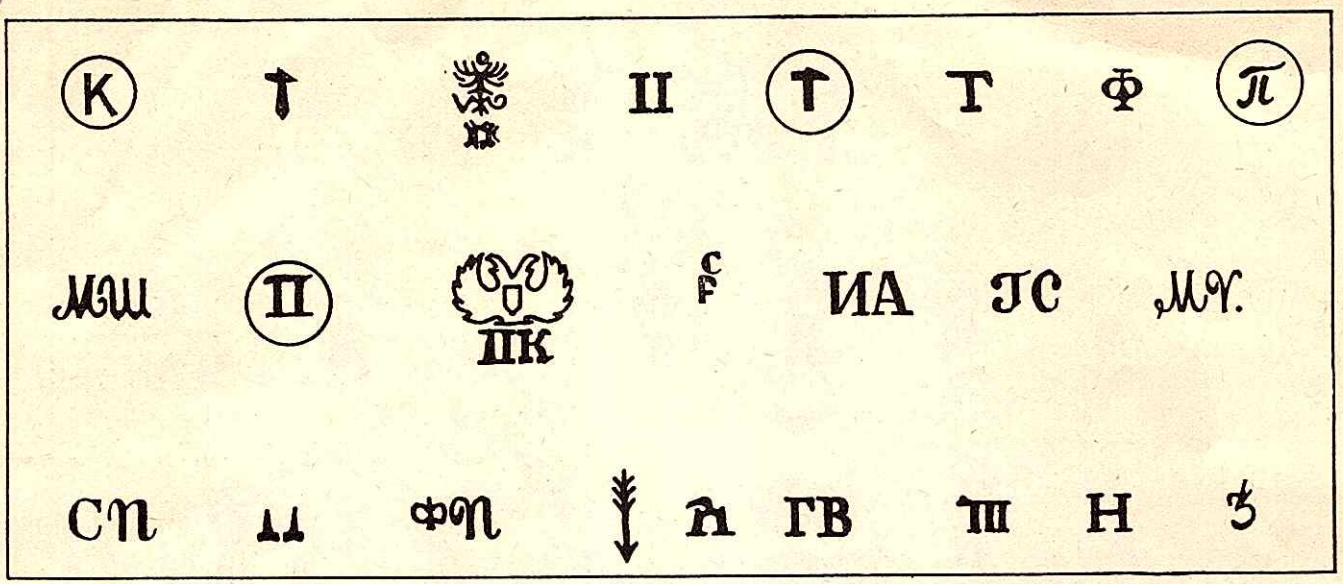


PLATE III: RUSSIAN MARKS ON A NAGANT REVOLVER AND A RUSSIAN MILITARY RIFLE.

4. [N] This is stamped following the obligatory test with smokeless powder on completed shotguns.

5. [5] This shows on rifled arms proved definitively with smokeless powder. (Those designed for use with black powder exclusively, and passing a definitive proof test with this, receive stamping No. 3.)

Small-bore weapons for rim-fire ammunition receive, when proved, stamping No. 3. Revolvers are also marked with stamping No. 3 after proof with black powder, or with No. 5 if proved with smokeless powder. All automatic pistols receive stamping No. 5.

An interesting discussion of proof tests as they exist in the several countries employing them appears in Richard Mahrholdt's *Handbuch für Waffenfreunde,* published at Innsbruck, Austria, in 1931. From it I quote the following:

OFFICIAL proofs.—"In all civilized" (take note, United States!—C. G.) "countries there exist laws which require arms makers to submit their products, before offering them for sale, to an official testing station to be 'proved.' Following the proof tests, those parts which are of first importance from the standpoint of strength, such as barrel and breech, receive stampings which indicate that they have successfully passed the requirements prescribed.

"Arms, or parts of arms, which have failed to pass, are segregated, or rendered unsuitable for further use.

"If the maker desires no further test, the proof of shotguns and weapons designed for lead bullets only is conducted with black powder alone. In Austria, a load is employed for the first (black powder) proof which exceeds in the pressure, which it develops on firing, that of the ordinary commercial loads by one hundred per cent in the first test, by 66 per cent in the second, and by 33 per cent in the third.

"The first and second tests are applied only to barrels. These are fitted with a special breech screw prescribed for such tests, and loaded from the muzzle. In 16-gauge guns, the first proof is carried out with 9.6 grams of powder and a lead cylinder weighing 57.6 grams; the second with 8 grams of powder and a 48 gram lead cylinder. Such tests will result at the very beginning in the segregation of faulty barrel materials for further attention. For the third test, at which time the barrel is completely bored, and breeched, there are used, for a 16-gauge arm, 6.4 grams of powder and 38.4 of shot.

"As a testing powder, Austria uses the extra fine sporting and target powder known as "No. 1." In Germany, similar arms undergo but two tests, these are more severe, however, than the Austrian. Thus the first German test is with three times the normal powder loading and double the normal shot charge. The second (carried out on guns completed and ready for use), involves a double powder charge and one and one-third the normal shot charge. Likewise in the case of rifles, the first test is with three times the usual powder load and a bullet of one and one-third times the normal weight, and the second with a double powder load and a bullet the same weight (one and one-third normal).

"Smokeless powder proofs of shotguns, and of rifles designed for lead bullets are conducted only on special request. The Austrian practice in this case (and the German as well) is to employ an especially powerful test powder with the regular bullet or shot charge ahead of it. Barrels designed for firing jacketed bullets are regularly proved with smokeless powder, without the need for any special request to that effect. The Austrian regulations require that the standard cartridge case (for the caliber tested) be completely filled with No. 3 smokeless powder, the regular commercial bullet to be placed ahead of this. This test is practically without significance, however, since the load employed barely exceeds the standard commercial charge.

"We must bear in mind the fact that the presence of proof marks is no assurance of the origin of a weapon. For example, weapons rough-finished in Austria, and completed and tested in Germany, will bear the regular German proof marks, and vice versa. Also, to the damage of the purchaser, certain arms are sold at fancy prices as 'genuine English,' which as a matter of fact were produced somewhere else at a low cost, but sent to England for proving, and stamped in addition with the name of some English firm which may actually be non-existent.

RUSSIA.—I have been unable to locate any data on the proving of arms in Russia. Lacking this, drawings were prepared of markings present on a Russian Nagant revolver, and a Russian military rifle. These appear in Plate III.

Proof Tests and Proof Marks

IV: Practices of Manufacturers in the United States

By Calvin Goddard*

IN the United States, no official proof house exists. As a result, it devolves upon each manufacturer to conduct such tests as he may deem proper. Obviously, it is to his advantage to know that his arms are soundly made, for if they are not, and mishaps occur, he will soon find himself facing suits for accidental injury.

In general, caliber .22 rim-fire arms for domestic sale are not proved, but rifles chambered for more powerful cartridges, and shotguns as well, are proof-tested in one manner or another. Pistols and revolvers are ordinarily not subjected to a proof test. The practices of various makers now producing arms in the United States, are as follows (according to reports received from them directly).

Browning Arms Co., St. Louis Mo. (Current products—automatic shotguns; "over and under" shotguns.) The arms marketed by this company are made in Belgium, where they are subjected to the standard Belgian proof tests for weapons of their class, passing which they receive the usual marks of acceptance.

Colt's Patent Fire Arms Manufacturing Company, Hartford, Connecticut. (Current products—revolvers, automatic pistols, single-shot pistols, automatic rifles.) "Each and every-one of our arms sold is tested before leaving the factory, and on both automatic pistols and revolvers will be found our mark—the letters 'V. P.' combined, inside a small triangle appearing on the upper forward section of the guard on the left hand side. . . ." It is unfortunate that the *nature* of the tests conducted has not been specifically outlined, but their adequacy may be assumed.

Crescent-Davis Arms Corporation, Springfield, Mass. (Formerly of Norwich, Connecticut, now controlled by J. Stevens Arms Company, Chicopee Falls, Massachusetts, which in turn is owned by the Savage Arms Corporation, Utica, New York. Current products—shotguns.) Proof practices—same as for Stevens Shotguns, *q. v.*

Dubiel Arms Co., Ardmore, Okla. (Formerly, Hoffman Arms Co. Current products—single-shot and repeating rifles of high power.) "We do not manufacture complete rifles nor ammunition, all we do is rebuild rifles and we use Springfield, Winchester, Remington and Mauser actions, and the actions have been test proved before we get them, also the ammunition."

Griffin and Howe, New York City. (Current products—single-shot and repeating rifles of high power.)

This firm failed to reply to my inquiry as to their proof practices. Since they use only commercially produced actions, however, the remarks for the Dubiel Arms Co., above, probably apply equally well to their output.

Harrington and Richardson Arms Company, Worcester, Mass. (Current products—revolvers, single-shot pistols, shotguns. This company formerly made automatic pistols also.)

It would appear that this company proves only such arms as it exports to countries under the British flag (although their correspondence is not definite upon this point). These are submitted to a test equivalent to the British proof for similar weapons, on passing which satisfactorily, those going to Australia or New Zealand receive the mark Guns shipped to other parts of the British Empire are proved, but not marked.

High Standard Manufacturing Company, New Haven, Connecticut. (Current products—caliber .22 single-shot and automatic pistols.)

"Each of our pistols is fired a great many times in the action tests, and in the sighting, and we consider that in a .22 caliber this is sufficient to guarantee complete safety."

Hunter Arms Company, Fulton, N. Y. (Current products—single- and double-barrelled shotguns.)

This company proof-tests its products as follows:

Gauge.	Shell.	Grains FFG Black Powder.	Grains 7C Shot.	Max'm Pressure (Lbs. per sq. in.)
12	3"	226	957	17,500
12	2¾"	178	738	14,300
16	2 9/16"	178	738	13,750
20	2¾"	157	657	14,650
410	2½"	65	273	15,675
10	2⅞"	260	1094	16,000
12	2¾"	206	875	15,900

It would appear that the pressures achieved should be sufficient to insure the solidity of the arms tested. The proof mark, applied to all barrels of this make, is:

Ithaca Gun Company, Ithaca, New York. (Products—single- and double-barrelled shotguns.)

"Each barrel on every Ithaca gun is proof tested with a load consisting of approximately two loads of powder and a load and a half of shot and this proof load sets up a predetermined pressure of about 40 per cent in excess of the maximum service load."

Proof marks are as follows:

(By special agreement the Ithaca Gun Company, the Lefever Arms Company, and the Western Arms Corporation, all of Ithaca, conduct their proof tests jointly, and employ the same set of proof markings—hence those illustrated will be found on the products of all three of these organizations.)

Iver Johnson's Arms and Cycle Works, Fitchburg, Mass. (Products—single- and double-barrelled shotguns, single-shot rifles, revolvers.)

"We provisional and definitive proof test shotguns, single and double, being governed by the Rules, Regulations, and scales formulated by the Gun Makers Company and the Guardians of the Birmingham (England) Proof House—Scale No. 4, Breech Loading Arms of Smooth Bore. As you undoubtedly know, the procedure is necessary on all shotguns exported to Australia and some other British possessions.

*Director of Research, Scientific Crime Detection Laboratory and Professor of Police Science, Northwestern University School of Law, Chicago, Ill. Lieutenant Colonel, Ordnance Reserve, U. S. Army. All drawings of proof marks in this series of articles were made by Esther Bohlman of Chicago.

TABLE A

PROPOSED LIMITS FOR SERVICE AND DEFINITIVE PROOF PRESSURES CORRESPONDING TO CERTAIN SHELL LENGTHS IN DIFFERENT SHOTGUNS

The limits are based on the British Rules and Regulations of 1925 and the Definitive Proof Pressures developed by the specifications, using No. 7 drop shot. Pressures are shown both in pounds and long tons per square inch.

Nominal Gauge	Nominal Chamber and Shell Length	Theoretical Service Pressure Limits Based on Definitive Proof Pressures (See Note B)		Service Working Limits for Factory Loaded Ammunition (See Note C)		Definitive Proof Pressure				
						Load		Pressures Developed		
		Mean	Maximum Individual	Mean	Maximum Individual	Powder in Grains	Shot in Grains	Mean	Maximum Individual	Minimum Individual
10	2–⅞	12000 5.35	14500 6.50	11200 5.00	12000 5.35	260	1094	16800 7.50	18100 8.10	15400 6.90
12	2–⅝	9800 4.36	12000 5.36	9500 4.25	10800 5.00	178	738	13700 6.10	15000 6.70	12500 5.60
12	2–¾	12400 5.53	15000 6.68	10500 4.70	12000 5.35	206	875	15900 7.10	17500 7.80	15200 6.80
12	3	12400 5.53	15000 6.68	11200 5.00	12300 5.50	226	957	17300 7.75	18700 8.35	16000 7.15
16	2–$\frac{9}{16}$	10100 4.53	12400 5.56	10100 4.50	11700 5.25	154	656	14200 6.35	15600 6.95	13100 5.85
16	2–¾	11200 5.00	13600 6.08	10500 4.70	12300 5.50	178	738	15700 7.00	17000 7.60	14400 6.40
20	2–½	10400 4.64	12700 5.68	10100 4.50	11700 5.25	136	574	14500 6.50	15900 7.10	13200 5.90
20	2–¾	11600 5.18	14000 6.28	10700 4.75	12900 5.75	157	657	16200 7.25	17600 7.85	14900 6.65
20	3	11600 5.18	14000 6.28	10700 4.75	12900 5.75	157	657	16200 7.25	17600 7.85	14900 6.65
28	2–½	12000 5.35	14500 6.50	11800 5.25	12700 5.65	130	547	16800 7.50	18100 8.10	15400 6.90
32	2–¾			9500 4.25	10700 4.75	109	465			
410	2			9500 4.25	10700 4.75	55	219			
410	2–½	12400 5.53	15000 6.68	9500 4.25	10700 4.75	65	273	17300 7.75	18700 8.35	16000 7.15

NOTE A—Definitive Proof Pressures are given even values in this table. NOTE B—These theoretical mean limits set to allow a 40 differential to mean Definitive Proof, while the theoretical maximum individual limits were set to allow a 25 differential to maximum individual Definitive Proof Pressures. NOTE C—These limits were set to conform to the maximum requirements previously reported by any one of the leading companies. It is recognized that these limits, in some cases, are higher than consistent with good results under normal conditions and that some companies do not load to as high limits but they are intended to cover all variations.

We give the Definitive Proof Test to all of our .22 caliber rifles and .22 Supershot Sealed Eight Revolvers."

Iver Johnson proof marks are as follows:

Provisional Proof: Definitive Proof:

Lefever Arms Company, Inc., Ithaca, N. Y. (Current products—single- and double-barrelled shotguns.) Proof practices same as for Ithaca Gun Co. *q. v.*

Marlin Firearms Company, New Haven, Conn. (Current products, cal. .22 and high power repeating rifles, repeating shotguns. Formerly made revolvers.)

"The following are the proof loads we use in testing our guns."

12 ga.—4¾ drams Dupont Lightning Smokeless Powder—1⅝ oz. shot
20 ga.—3 drams Dupont Lightning Smokeless Powder—1¼ oz. shot
25/20—10 drams Dupont Lightning Smokeless Powder
32/20—13 drams Dupont Lightning Smokeless Powder
30/30—25 drams Dupont Lightning Smokeless Powder

Their proof mark consists of the letters J. M. in an oval, thus:

O. F. Mossberg and Sons, New Haven, Connecticut. (Products—caliber .22 rifles; .410 gauge single and repeating shotguns; repeating .22 caliber pistols.)

This firm proof-tests, in accordance with British proof regulations all rifles shipped to England or its dominions, the latter accepting certificates to the effect that the arms have been proved in conformity with British regulations. Proof mark consists of the single letter "P."

Their .410 gauge shotguns are proved at 13,000 pounds pressure. Proof mark is in the form of a P surrounded by a circle:

Parker Brothers, Meriden, Connecticut. (Products—single- and double-barrelled shotguns.)

"Parker Brothers, as members of the Institute of Small Arms and Ammunition Manufacturers, have subscribed to and are following the rules of proof testing set up by the Institute. These rules are practically the same as those of the London and Birmingham proof houses. . . ."

So far as I am aware, the only difference in the method of proof testing Parker Guns and others is that ordinarily definitive proof is done while the barrels are in the white. Parker Brothers, however, defer definitive proof until the barrels are fully completed, finally bored, and browned, so that when the proof test is made the barrels are entirely

TABLE B

LOADING DATA FOR DEFINITIVE PROOF LOADS

Nominal Gauge	Nominal Shell Length	Definitive Proof Load		Over Powder Card Wad		Capsule Wads			
						Under Shot		At Front End	
		Powder in Grains	Shot (No. 7 drop) in Grains	Thickness	Diam.	Thickness	Diam.	Thickness	Diam.
10	2–7/8	260	1094	.050	.782	3/8"	0.756	3/8"	0.686
12	2–5/8	178	738	"	.739	"	0.686	"	0.632
12	2–3/4	206	875	"	.739	"	0.686	"	0.632
12	3	226	957	"	.739	"	0.686	"	0.632
16	2–9/16	154	656	"	.677	"	0.632	"	0.592
20	2–1/2	136	574	"	.634	"	0.595	1/4"	0.570
20	2–3/4	157	657	"	.634	"	0.595	"	0.570
20	3	157	657	"	.634	"	0.595	"	0.570
28	2–1/2	130	547	"	.547	"	0.525	"	0.419
32	2–3/4	109	465	"	.512	"	0.419	"	0.370
(36) 410	2	55	219	"	.412	"	0.370	3/8"	0.370
(36) 410	2–1/2	65	273	"	.412	"	0.370	"	0.370

POWDER—Black Powder is recommended, granulation: FFFg, specific gravity: 1.82 ± 0.02.

SHOT—Is loaded in rolled paper capsules with felt wads at each end of the sizes listed. This capsule should be held in the shell either by glue or shellac.

finished and no more material will be removed by any subsequent operation.

The Parker proof mark, which is rolled upon the flat or water table of each tube, is as follows: OVERLOAD PARKER BROS APPROVED

Remington Arms Company. Arms Plant, Ilion, New York. Ammunition Plant, Bridgport, Connecticut. (Current products—single-shot and repeating rifles, repeating and automatic shotguns, "over and under" shotguns, automatic rifles, double derringers, metallic ammunition and shot shells—formerly made revolvers and automatic pistols.)

"All shotguns and highpower rifles are proved according to the definitive English proof.

"Domestic small bore rifles, such as .22 caliber, etc., are not proved, only on customer's request. All export guns are proved. After proof, our guns are then tested a number of rounds with the regular service ammunition. All guns which have been proved bear the mark: R.E.P.

"This designates, 'Remington English Proof,' and will be found stamped on the breach end of the barrel."

Savage Arms Corporation, Utica, New York. (Current products—single-shot and repeating rifles, repeating and automatic shotguns. Formerly made automatic pistols.)

"It is the practice of this company to subject shotgun barrels and rifle barrels to a *provisional proof test* to the unfinished barrel. After the barrel is finished, it is given a final definitive proof with a proof load developing from 30 per cent to 35 per cent above normal. The barrels are then stamped with our proof test stamps as shown." These are (for shotguns) SAP and (for rifles): SP

R. F. Sedgley, Inc., Philadelphia, Pennsylvania. (Current products—caliber .22 "Baby Hammerless" revolvers, high power repeating sporting rifles, signal pistols, gas pistols, fountain pen pistols (for .22 R. F. ammunition) caliber .22 adapters (for .38 and .45 auto pistols). Formerly made .32 hammerless revolvers.)

"All of the rifles that we are putting out are proof tested with a 50 per cent overload, and every barrel so proved is stamped with our proof stamp, which is an S in an oval: (S) The rifle is then shot with commercial ammunition, the shells being carefully examined for chamber marks, after which the metal work is finished up and blued, and again tested and shot in, the second testing not being as heavy as the original proof test."

Smith and Wesson, Springfield, Mass. (Current products—revolvers and automatic pistols.)

"The present revolver ammunition as manufactured by any of the ammunition companies may be accepted as standard for use in our arms, and for proof loads we will accept 50 per cent increase over the standard.

"Insofar as our regular run of arms goes, they are merely fired with standard loads, but this is merely to check up functioning and with no idea of proofing."

Sporting Arms and Ammunition Manufacturers' Institute, New York City.

The nearest approach to an official proof house in the United States is the Sporting Arms and Ammunition Manufacturers' Institute, with headquarters in New York City. This organization, composed of some 15 of the most prominent makers of arms, ammunition, and explosives in this country, has undertaken, of its own volition, to establish proof tests, standardized pressure gauges, uniform chamber sizes, etc., along the lines followed by the Permanent International Commission on Small Arms overseas.

Proof specifications, as adopted by this Institute and voluntarily followed by its members, appear in Tables A and B.

J. Stevens Arms Company, Chicopee Falls, Massachusetts. (Current products—single shot and repeating caliber .22 rifles.

Single shot pistols. Single, double, and repeating shotguns. Formerly made high power sporting rifles.)

"All of our shotgun barrels are tested with a proof load developed for us by the Remington Company. This load does not have quite the same characteristics as the old black powder proof load which was based on English proof house requirements.

"The proof load we use is different in that the pressures are not sustained as uniformly through the same distances in the barrels as the black powder proof loads. However, the initial breech pressure is higher and the drop in pressure as the charge progresses through the barrel still leaves a pressure amply sufficient to prove the strength of the barrel.

"All of our shotgun barrels so tested are stamped with the initials of the inspector making the test and the letters 'P. T.' For example, 'A. M. P. T.,' 'A. M.' being the initials of the inspector and 'P. T.' standing for proof test. This stamp is placed on the barrel lug."

"On our caliber .22 rifles, some of our older models are not adapted for use with the new caliber .22 high speed ammunition, and any of these models now leaving the factory have the barrels stamped "Regular cartridges." Rifles now leaving this factory which are suitable for use with this high speed ammunition are not marked "Regular cartridges." These models are tested with caliber .22 ammunition furnished us by Remington, which we understand developes pressures about 10 per cent in excess of the high speed cartridges that are now sold commercially."

Western Arms Corporation, Ithaca, N. Y. (Current products—double-barrelled shotguns.) Proof practices same as for Ithaca Gun Co., *q. v.*

Winchester Repeating Arms Company, New Haven, Connecticut. (Current products—single-shot and repeating rifles, double-barrelled and repeating shotguns, metallic cartridges and shot shells. Formerly made automatic shotguns.)

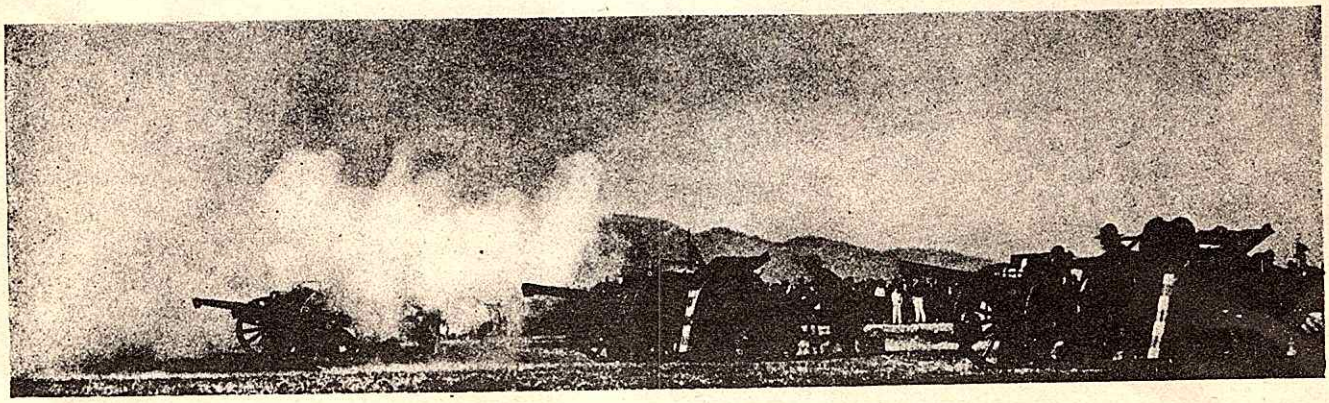
"Winchester barrels are proof shot in the rough before completely finished, the proof known as provisional, and again as a completed gun, known as definitive. The standard laid down for the British proof regulations adopted by the Guardians of the Birmingham Proof House dated 1925 is followed."

The Winchester proof mark (found on barrel and frame) is as follows:

References

1. A History of Firearms, by Major H. B. C. Pollard. Geoffrey Bros., London, 1925.
2. The Book of the Pistol, by Major H. B. C. Pollard. Robert M. McBride and Company, New York, 1918.
3. Rules, Regulations and Scales Applicable to the Proof of Small Arms. British War Office, London, 1925.
4. Text Book of Small Arms. His Majesty's Stationery Office, London, 1909.
5. The Gun and its Development, by W. W. Greener. Cassell, Pelter, Galpin and Company, London, 1881.
6. *L'Armurerie Liegoise,* No. 361, May, 1932, pp. 55-56.
7. *Lois et Reglements concernant les Eprouves des Armes à Feu en Belgique.* H. Vaillant-Carmanne, printer, Liége, 1924.
8. *Handbuch für Waffenfreunde.* Richard Marholdt. Innsbruck, 1931, p. 33.
9. *Banc Public d'Epreuve des Armes à Feu—Decrets, Statuts, et Règlement.* J. Thomas & Company, Printers, St. Etienne, 1902.
10. Same, 1928 edition. *"La Loire Republicaine,"* Printers, St. Etienne, 1928.
11. *Bulletin Trimestriel de la Société d'expansion Belge vers l'Espagne et l'Amérique Latine.* Vol. 2, No. 4, Liége, July, 1914.
12. Circular of the *Banco Nazionale di Prova delle Armi da Fuoco Portatili* (Italy). No date.
13. Circular—*Marcas de las Armas, para los Bancos de Prueba* (Spain). No date. (Current in 1929.)
14. Sample Certificates as issued by the Eibar Proof House covering arms passing its various tests (Ten varieties, undated, but current in 1929).
15. *Značky na vyzkoušené střelné zbraně* (Czechoslovakia). No date. (Current in 1929.)
16. Correspondence with officers of U. S. Ordnance Department in the United States and U. S. Military Attachés in Europe, 1929-1930.
17. Correspondence with arms makers in the United States, 1933.
18. Correspondence with the Sporting Arms and Ammunition Manufacturers' Institute, New York, 1933.

Editor's Note—Publication at this time of the above reference bibliography is not to imply that the above article concludes Colonel Goddard's remarkable series on "Proof Tests and Proof Marks." Thus far he has described practices of the British companies (in the November-December issue, 1933), those of the Continental companies (January-February and March-April, 1934, issues) and the above article on practices in the United States. The concluding article of the series, on which the author is now at work, will describe the practices and marks of the U. S. Government. It is hoped that it will be ready for publication in the next issue of Army Ordnance. If not, readers may rest assured that it will appear as soon as the research by the author is completed.



Proof Tests and Proof Marks

V: *Practices in the U. S. Military Service*

By Calvin Goddard*

SEARCH of available records discloses the fact that the first musket of Springfield manufacture to bear a proof mark was produced in 1799. This arm bore the letters "V.P.L." (see Plate IV, page 33, for this and other illustrations herein referred to). In 1802, a new stamping appeared, in the form of the letters "V.F." The following year (1803) these became "V.P.," while in 1806 we find a new design—an eagle's head in vertical line between a "P" and a "V." This last marking was continued with certain variations (as pictured in Plate IV) up to 1841.

During the period 1833-1842, the old regulation flint musket was being supplanted by the percussion type weapon. Many of the former were adapted for the new lock, with the result that numerous slight variations in proof marks occur in arms of this era—while many, indeed, lack them altogether. However, the "Eagle Head—P. V.," marking was continued without substantial change until 1862.

Between 1862 and 1869, the transition period between the percussion cap and the metallic cartridge, the same conditions prevailed. In 1869, an eagle head over crossed arrows, with the letters "U. S." beneath, appeared. This marking continued until 1878.

We lack definite information as to practices between 1878 and 1898, when the Krag-Jorgensen model of that date was adopted. (The information supplied one unfortunately disregards the Krag models of 1892 and 1896.) It is reasonable to assume, however, that new weapons of the old type produced during this period continued to bear the old marking.

With the advent of the 1898 model Krag, the proof mark became a letter "P" stamped on the barrel. In some cases it appears on the under side of the stock just rearward of the tang. This system of marking was continued upon the current model Springfield, and has remained in continuous use, with variations, to the present time.

Current practice is to place the letter "P" on the barrel after it has been proof-fired. Subsequent to assembly, a "P" in a closed circle is stamped twice upon the under side of the stock, one mark behind the other, to the rear of the tang. This indicates that tests for both proof and function have been conducted. In addition, a punch mark is placed on the receiver just below the serial number, and on the bolt handle close to the body of the bolt, as well.

The proof of a barrel consists in firing two cartridges giving a pressure of 68,000 ± 2,000 lbs., followed by five rounds of service ammunition developing normal pressures.

Automatic pistols and revolvers chambered for the .45 automatic pistol cartridge are tested with loads developing 20,000 lbs. pressure. On acceptance, they are stamped with the small letter "P." This is placed—in the case of pistols—on the barrel lug; in the case of revolvers—on the frame.

(While the above data were compiled from studies of arms produced at Springfield, it may be noted that those fashioned at Rock Island and Harper's Ferry conform in markings to those above described.)

ADDENDUM: In paragraph one of the second instalment of this series of articles (ARMY ORDNANCE, January-February, 1934, page 225), the statement is made that the Belgian Proof House at Liége was established in 1888. This should be amended to read "legally recognized by the Belgian Chamber of Deputies in 1888." As a matter of fact, its inception dates to 1672. On May tenth, of that year, the Prince of the Church then reigning in those parts, published an ordinance embodying two principal provisions, viz.: 1. The imposition upon all vendors of arms of the obligation to submit them to proof tests, and, 2. An absolute prohibition upon all traffic in unproven weapons.

This ordinance was the result of complaints addressed to the Burgomaster of Liége by many citizens of that city, who affirmed that numerous seriously defective pieces were being sold by unscrupulous dealers. It may be interesting to compare its text, printed below, with that of the British Charter of 1637 (extracted in the 1st instalment of this series of articles in ARMY ORDNANCE, November-December, 1933, page 140, paragraph 2.)

"Ordinance: Governing the Proof of Arms (10th May, 1672). His Most Serene Highness and his Privy Council, being informed by complaints both from his subjects and his neighbors, that certain defects exist in arms fabricated in this his City, his said Highness, desiring both to advance the welfare of (his) commerce, and to provide adequate safeguard to purchasers, has found it suitable to establish the following regulation, to-wit:

That the Magistrate of his said City shall designate a public place whereat the proving of arms shall be carried out, to which (place) all merchandisers (of arms) shall be held and obliged to bring all musket barrels or other (barrels) of whatever sort, both those imported from without and those forged in the said City, together with the powder and lead necessary to their proof.

And being once well and soundly proven, these (weapons) shall be stamped with the arms of His City, for which (service) the dealers shall pay to the profit of His City, five sols (equivalent to five cents) for each musket, gun, or musketoon-barrel, and ten liards (1¼ cents) for each pistol barrel.

That no arm may be sold or accepted in this City and its suburbs which shall not have passed this proof and received the City's mark—under penalty of one florin (forty cents) fine, in addition to the confiscation of each barrel (involved).

His said Highness enjoins upon one and all (of his subjects) that they conform to this decree, and (especially upon) those whose duty it may be to undertake the enforcement of the present edict.

Done in the Council of His said Highness, 10th May, 1672."

The ordinance of 1672 was followed by a set of regulations,

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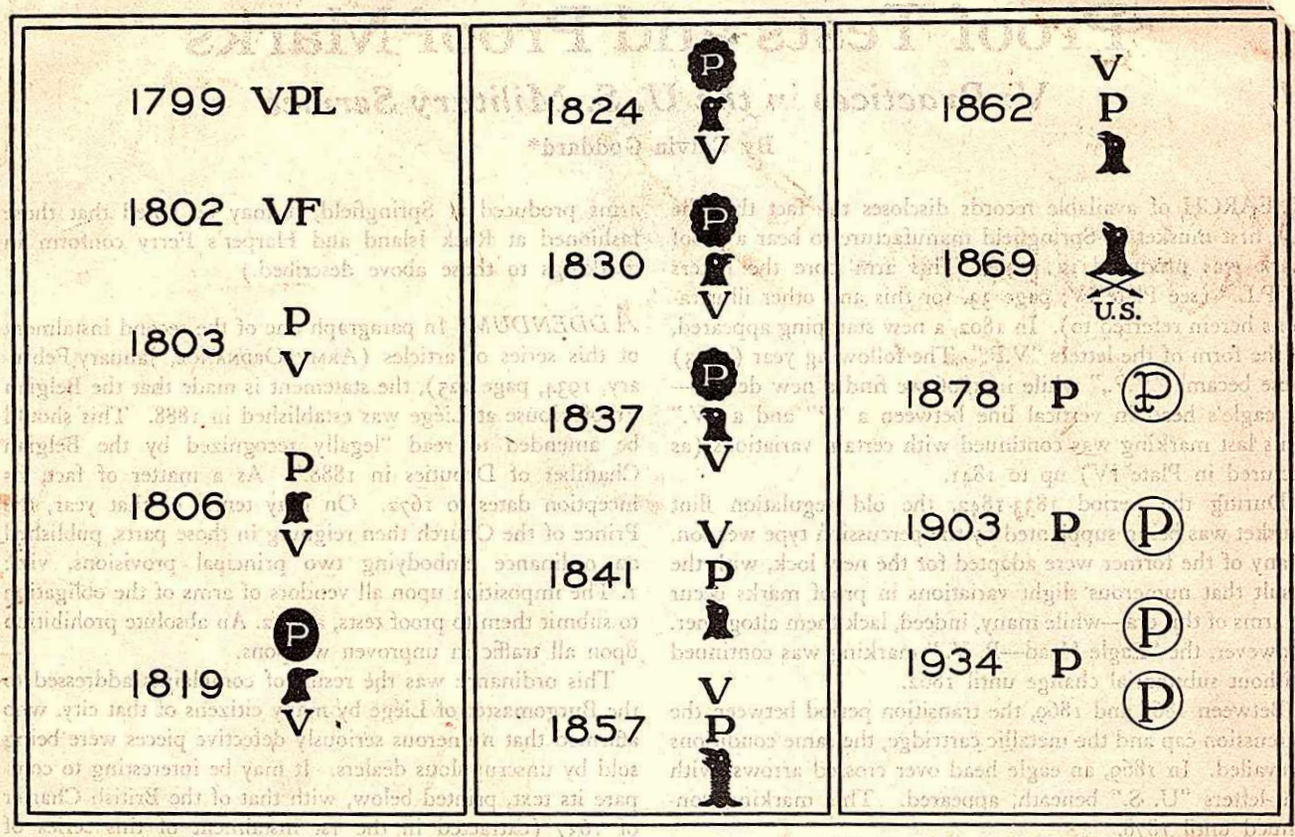

Proof Marks Used at United States Government Armories, Springfield, Harpers Ferry, Rock Island, 1799 to 1934.

published August 29th of the same year, outlining the provisions under which it should operate. One of these established, as punishment for counterfeiting the mark of the City, or employing any other fictitious mark (in addition to "the pain of the Law") deprivation of the rights of citizenship, plus a fine of one hundred golden florins—and confiscation of all arms falsely stamped.

The ordinance and regulations of 1672 seem to have obtained until 1810, when Napoleon 1 of France, Belgium then being under French domination, issued a new decree, much more comprehensive than its predecessor. One provision established a fine of fifty to one hundred francs for vendors of barrels of calibers not conforming with the marks stamped upon them at the time of proving.

Followed the regulation of 1818 which, among other things, instructs the local police (of Liége) to make periodic visits to the shops of those engaged in the vending of arms to assure themselves that no barrels not properly proved are going into commerce.

Subsequent to the assumption of indepndent sovereignty by Belgium, four Royal Decrees issued in fairly rapid succession (1836; 1846; 1849; and 1853), enlarging upon certain features in the administration of Proof Regulations. In article 40 of the Royal Edict of June 16, 1843, we find illustrated three proof marks which yet remain current, namely, the "E.L." intertwined (see Army Ordnance, January-February, 1934, page 225, last line), the "Tower" (see line eight, column two, same page), and the mark of acceptance (the letters "E.L.G." in an oval surmounting a star (see line six, same column and page). With respect to these particular stampings, then, we can state definitely that they have been current for close to a hundred years.

As previously indicated, the law of (May 24) 1888 gave the Belgian Proof System a legal status which it had not previously enjoyed, despite the fact that the provisions of the several decrees and ordinances establishing it and defining its functions had long been carefully observed. In which connection, it may not be amiss here to quote from a report of the Central Committee of the Chamber of Deputies which was then considering the enactment of this piece of legislation, in which we learn that:

"Although regulated by the State, the Proof House does not belong to it; it is an establishment founded and maintained by arms makers.

"It enjoys no civil identity. As a result, it occupies an uncertain position as a public utility secularly recognized. It cannot possess the personal property required for its operation, nor be party to a suit at law.

"The object of a law (the one then under consideration) is principally to put an end to this situation by giving the Proof House a judicial identity—it tends also to define more clearly the police powers of the agents of said Proof House, to render more concise the definition of infractions (of proof regulations) and improve the character of (their) enforcement."

The activities of the Liége Proof House were subsequently further regulated by the Royal Decrees of March 6, 1889, Jan. 17, 1892, July 11, 1893, and Jan. 30, 1897. Later, the law of 1888 was modified by one enacted Aug. 10, 1923, this in turn being supplemented by Royal Decrees of (June 30), 1924, (May 24), 1928, (Nov. 12), 1929, and (Feb. 26), 1930.

Thus we see that the Belgians—not to mention others among our European brethren—take their proofs seriously.